303

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L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

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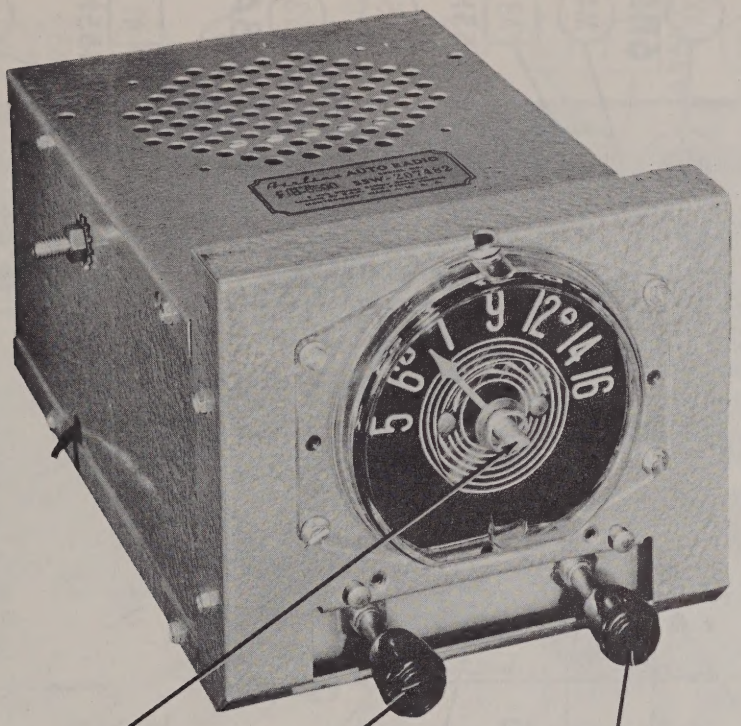
AIRLINE MODEL
FJB-6590A



AIRLINE MODEL
FJB-6590A

TRADE NAME	Airline Model FJB-6590A (For 1955 Ford Automobiles)
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Ill.
TYPE SET	Battery Operated Custom Built AM Superheterodyne Automobile Receiver
TUBES (Six)	Types: 6BA6 RF Amp., 6BE6 Conv., 6BA6 IF Amp., 6AV6 (or) 6AT6 Det.-AVC-AF Amp., 6AQ5 Output, 6X4 Rectifier
POWER SUPPLY	6 Volt Storage Battery RATING 5 Amp. @ 6.3Volts DC
TUNING RANGE—BROADCAST	538KC-1610KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	455KC (400~Mod.)	Tuning gang fully open.	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output.
2.	68MMF	High side to antenna receptacle. Low side to chassis.	1610KC	"	"	A5	"
3.	"	"	1400KC	Tune to 1400KC signal.	"	A6, A7	"
4.	"	"	600KC	Tune to 600KC signal	"	A8, A9	Adjust for maximum output. Repeat step 3.

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PARTS LIST AND DESCRIPTIONS

AIRLINE
Model FJB-6590A

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		AIRLINE PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amp.	6BA6	6BA6	7BK	
V4	Det.-AVC-AF Amp.	6AV6	6AV6	7BT	6AT6 used as an alternate.
V5	Output	6AQ5	6AQ5	7BZ	
V6	Rect.	6X4	6X4	5BS	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	AIRLINE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■20	350	CE-86		TM-3029	T-470	
B	▲20	350					
C	20	25					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	AIRLINE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2A	.1	400	CX104-4				
B	.1	400				CBT602	
C	.1	400					
C3	100			DD-101	801-101	UC-531	
C4A	220						
B	5000						
C	5000		♦PC-151	♦PC-151	♦1408-02		
D	250						
E							
C5	4000	500				MCE-463	Note 1
C6	.015	400		DD16-153		PT6115	Note 2
C7	.01	600		D6-102	GP3-333-103	PT611	
C8	.008	1600	C802-16	DD16-802		PT1628	
C9	.5	100				RF480	
C10	.5	100				RF480	

Note 1. Some versions may use a .002MFD unit in this application.
Note 2. Some versions may use a .01MFD unit in this application.
♦ Items C4A, C4B, C4C, C4D, C4E, R9A, R9B and R9C are combined in one unit. When replacing items separately, C4D and C4E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	AIRLINE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500KΩ	½	RV-145	ABT-66	A47F2-500K	Q13-133X	UT-430	Volume (Tap at 180KΩ)
B	Shaft	½	Not Req.	AK-3	FS-3	Not Req.	Not Req.	Attach to R1A.
C	Switch	½	Not Req.	KB-4	SWE-12	76-1	US-26	Attach to R1A.
R2A	2Meg	½	RV-146	B-76	A47-2Meg-Z	Q13-139	U-55	Tone
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A.

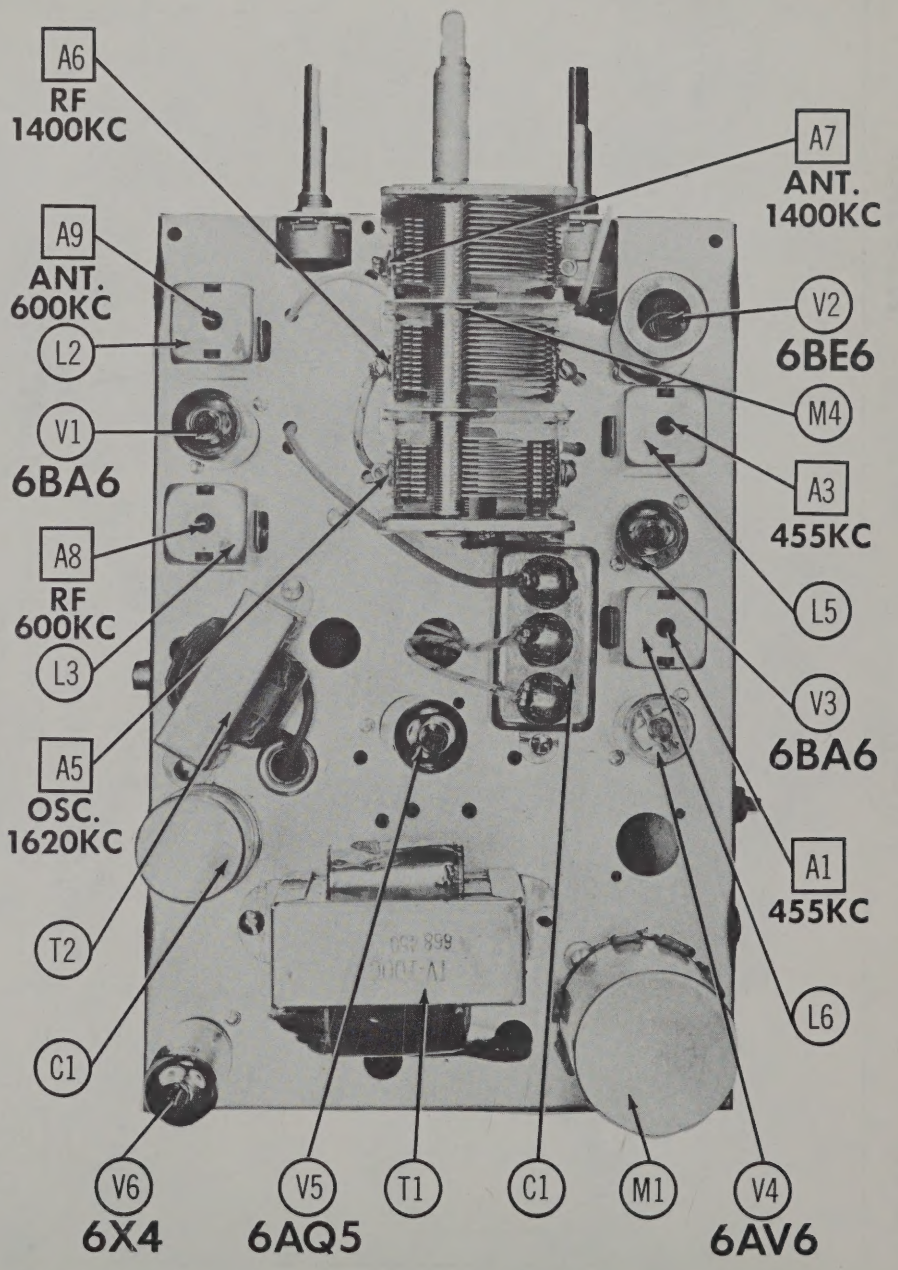
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R3	1.2Meg	½		BTS-1.2Meg	
R4	470Ω	½		BTS-470	Note 1
R5	22KΩ	½		BTS-22K	
R6	22KΩ	2		BTB-22K	
R7	1500Ω	½		BTS-1500	Note 2
R8	2.2Meg	½		BTS-2.2Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R9A	6.8Meg	½	♦PC-151	BTS-6.8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	
R10	22KΩ	½		BTS-22K	
R11	330Ω	½		BTS-330	
R12	1000Ω	1		BTA-1000	
R13	82Ω	½		BTS-82	
R14	82Ω	½		BTS-82	

Note 1. Some versions may use a 560Ω ½W resistor in this application.
Note 2. Some versions may use a 2700Ω ½W resistor in this application.
♦ Items C4A, C4B, C4C, C4D, C4E, R9A, R9B, R9C are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	6.3VCT 3A	470VCT .053A			TV-100C		P-2970		22R20 ①	

① Remove frames, use channel frame packaged with unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5.2KΩ	3.7Ω	TO-4502	Z1107	A-2930	A-3877	24S51	S-3X	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	AIRLINE PART No.	QUAM PART No.	
SP1	6" x 9"	PM	3.7Ω	PM-901	69A3	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. RF Choke	1.1Ω		L200	19-1005*		4624*	
L2	Ant. Coil	44Ω	4.6Ω	57FB-3				
L3	RF Coil	90Ω	6.3Ω	57FB-4				
L4	Osc. Coil	5.7		L201	14-1033■	BC-381■	71-Osc.■	Tapped ② .6Ω
L5	Input IF	15Ω	15Ω	1655-6	16-6758	BC-352	12-C1	
L6	Output IF	15Ω	15Ω	1655-6	16-6758	BC-353	12-C2	
L7	Vib. Hash Choke	0Ω		L202				
L8	Fil. Choke	0Ω		L203	19-4215	BC-537	5221	

* Connect in series with 10MMF Cap.
■ Drill mounting hole.

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				AIRLINE PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interruptor	6.3V	115∿	V-83 V-83A ①	5301	859	5301	① Alternate vibrator

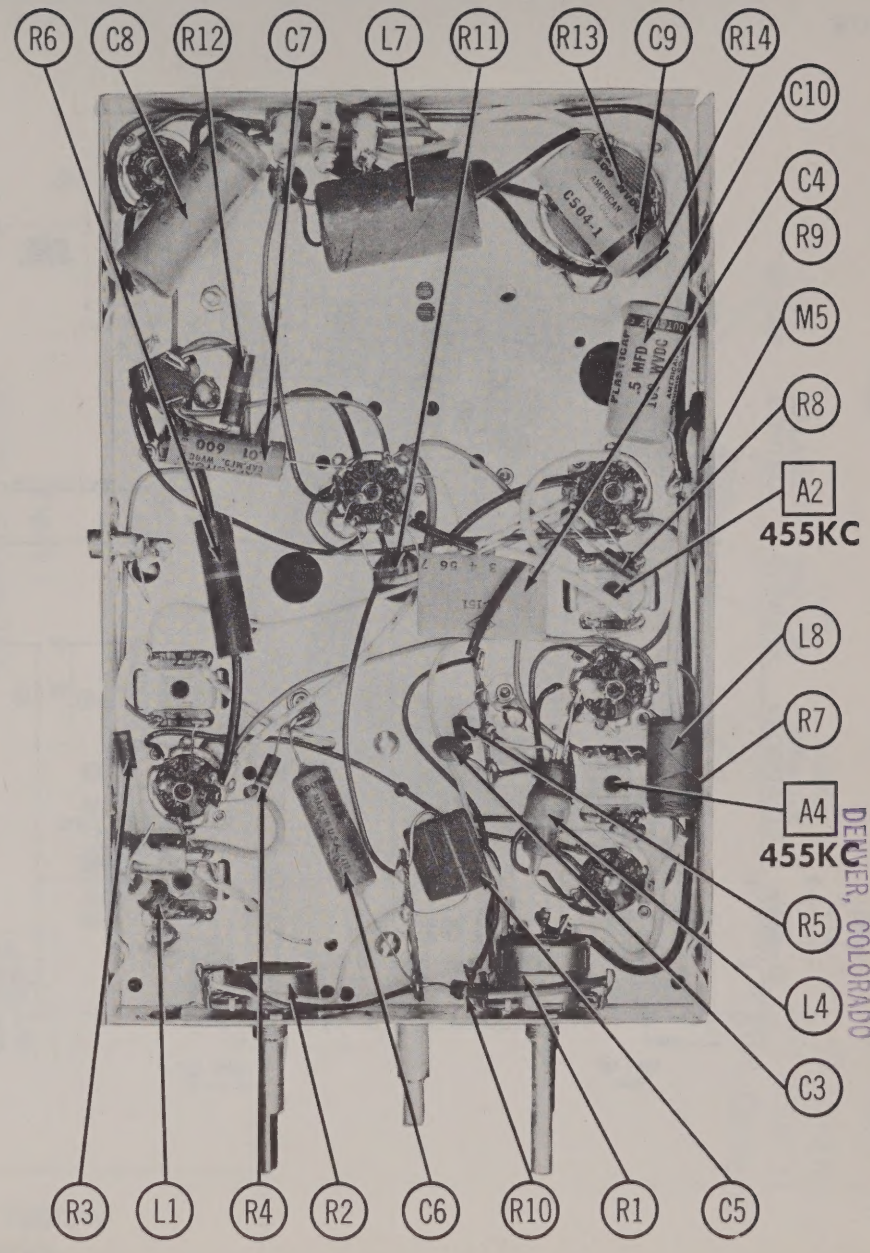
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			AIRLINE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	14A	A200	FH256	307014. (SFE14A)	155014	SFE14	HRI

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M3	Dial Light	T-47	#47
M4	Tuning Cap.	CV-145	3 Gang (20-375MMF, 20-375MMF, 31-195MMF)
M5	Spark Plate		
	Knob	H5F3	Tuning
	Knob	H5F6	Tone & on-off-volume

CHASSIS—BOTTOM VIEW



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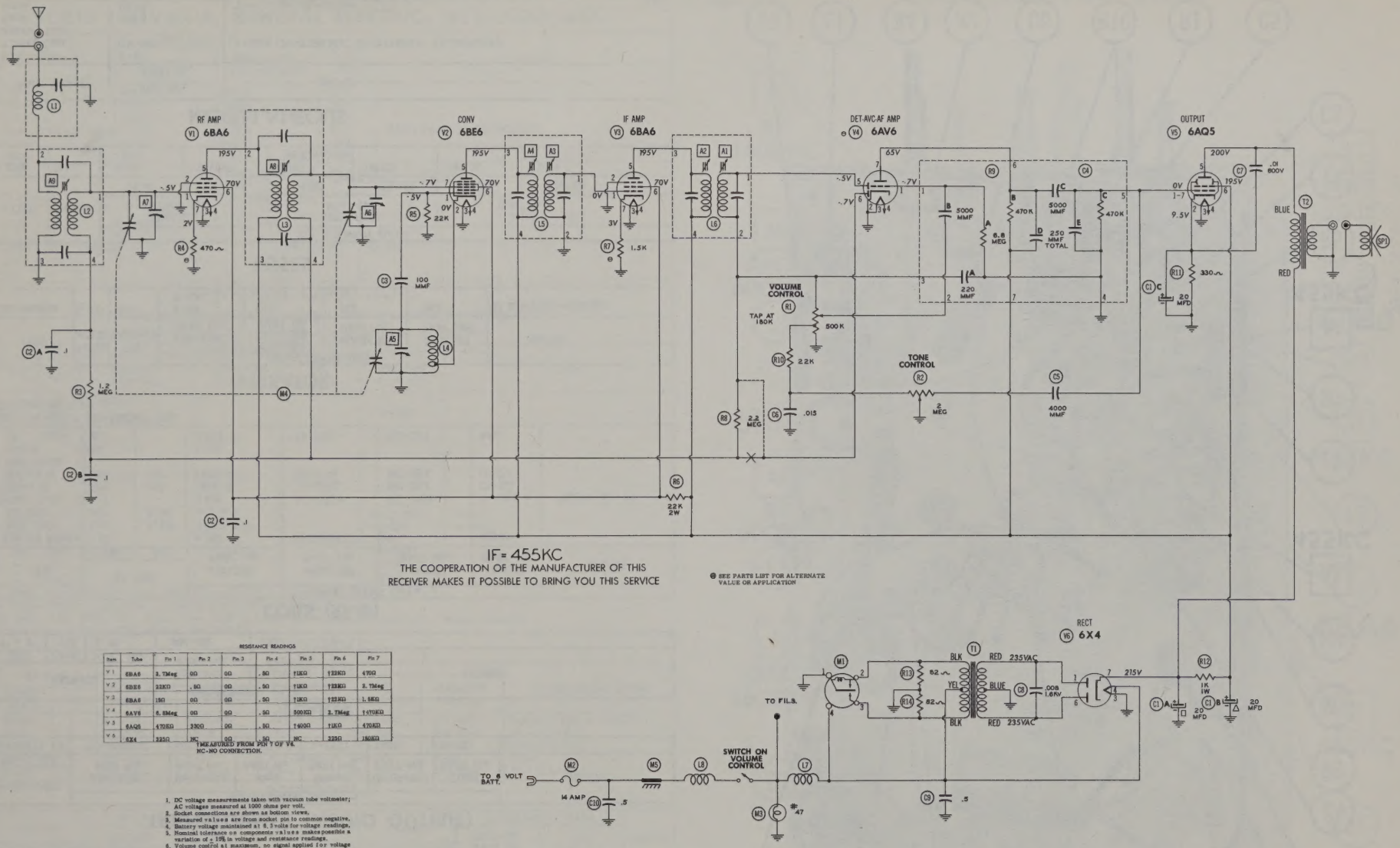

IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

@ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6BA6	2. 7Meg	0Ω	0Ω	.5Ω	1KΩ	122KΩ	470Ω
V 2	6BE6	22KΩ	.5Ω	0Ω	.5Ω	1KΩ	122KΩ	2. 7Meg
V 3	6BA6	1MΩ	0Ω	0Ω	.5Ω	1KΩ	122KΩ	1. 5MΩ
V 4	6AV6	6. 8Meg	0Ω	0Ω	.5Ω	500KΩ	2. 7Meg	1470KΩ
V 5	6AQ5	470KΩ	330Ω	0Ω	.5Ω	1400Ω	1KΩ	470KΩ
V 6	6X4	325Ω	NC	0Ω	.5Ω	NC	325Ω	180KΩ

*MEASURED FROM PIN 1 OF V6.
NC-NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 6.3 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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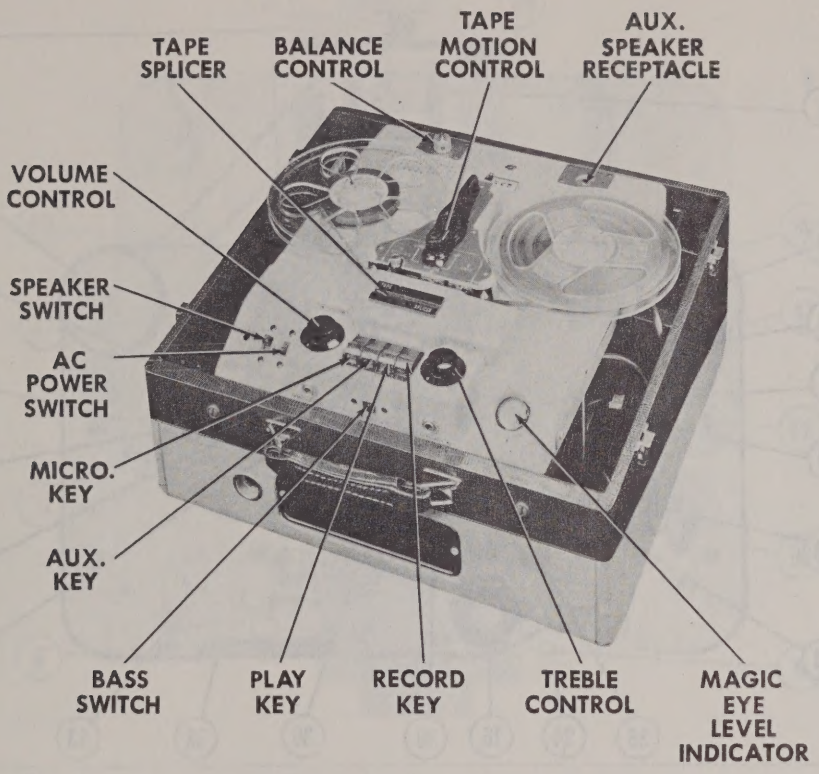

Figure 1

GENERAL INFORMATION

The DuKane "Tru-Fidelity Model 11A200 Tape Recorder incorporates a single control which operates the following mechanical functions: Fast Forward, Forward, Off, and Rewind. Four pushbuttons control the amplifier functions for play and record modes of operation.

The DuKane is designed to record and playback two tracks of material on standard width recording tape, which doubles the playing time of a 5" or 7" reel, with no loss of frequency response or quality. Recordings can be made from a radio, television receiver or phonograph, in addition to those made directly from the microphone. Recordings can be played back through the self-contained speaker or an external speaker through use of the Auxiliary Speaker Jack.

This recorder has two tape speeds, 7 1/2" and 3 3/4" per second. Using both tracks of the tape, the recording time is as follows:

Size Reel	Speed 3 3/4"	Speed 7 1/2"
5"	1 hour	1/2 hour
7"	2 hours	1 hour

Model 11A200 is designed to operate on 60 cycle, 105-125 volts AC supply only.

CAUTION: Severe Damage Will Result If Connection Is Made To A Direct Current (DC) Line.

Manufactured by:
DuKane Corporation
St. Charles, Illinois

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DUKANE
MODEL 11A200

DUKANE
MODEL 11A200

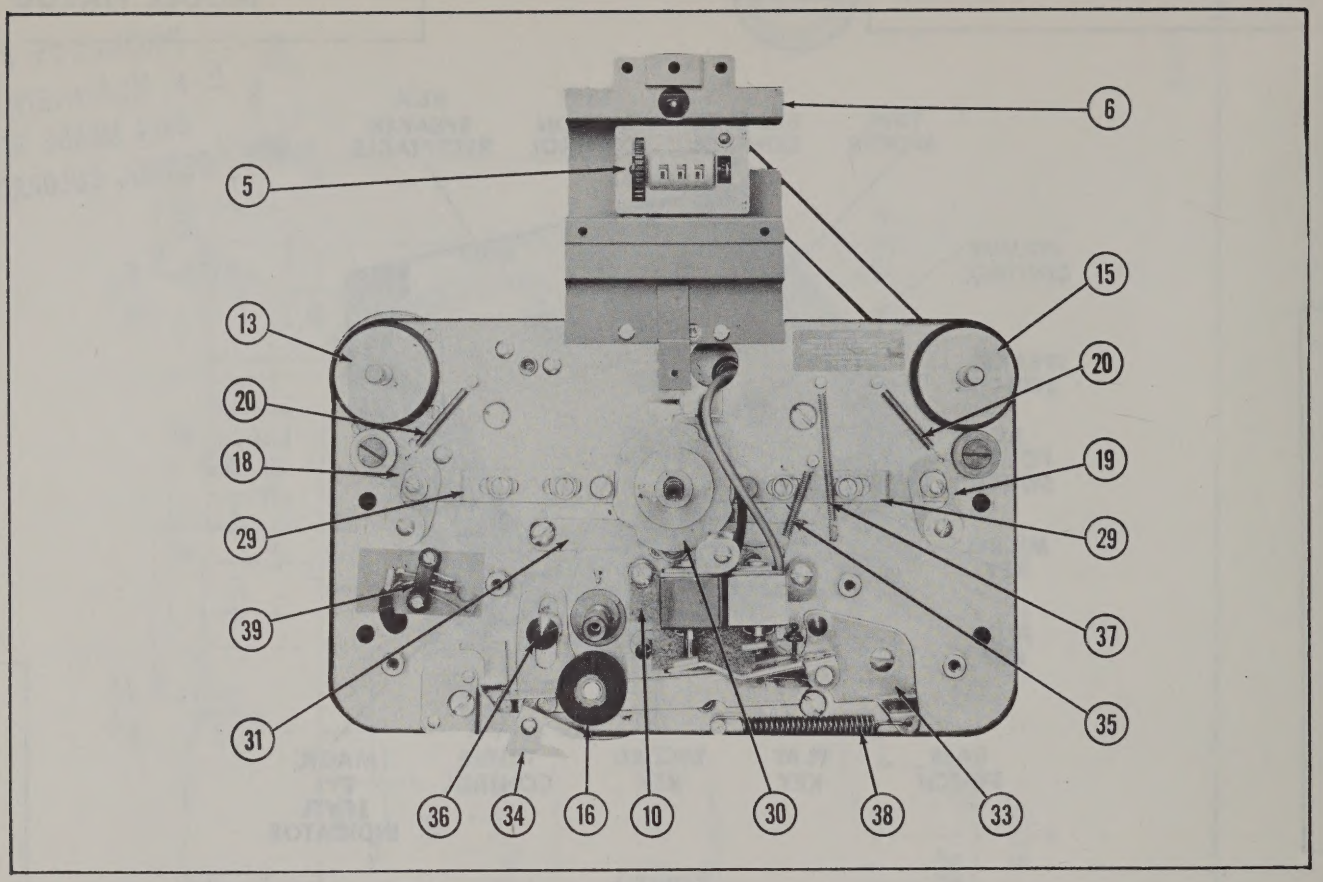

Figure 2

SPECIFICATIONS

Rewind Time-

Full 7" reel - 80 seconds

Fast Forward Time-

Full 7" reel - 100 seconds

Frequency Response - Pre-Amplifier-

At 3 3/4" per second ± 1 1/2db 50 to 7500 CPS.
At 7 1/2" per second ±1 1/2db 50 to 10,000 CPS.

Signal To Noise Ratio-

Recording from microphone - 55db
Distortion less than 1%

Frequency Response - Booster Amplifier-

Flat except in the Series of Serial 6000 which is down approximately 4db at 50 cycles.

Overall Distortion - Pre-Amp. And Booster-

Less than 5% at 5 Watts.

Inputs-

Microphone, Auxiliary, and Public Address.

Outputs-

Phones-High Impediance, Auxiliary Speaker - 8 ohms.

OPERATING INSTRUCTIONS

Preparing The Recorder For Use-

1. Remove the power cord from the storage compartment and plug it into a 115 volt, 60 cycle, AC outlet. Slide the switch marked "Power" up to the "on" position exposing the white dot and the Pilot Light will glow.

2. Select the desired recording speed by lifting the knurled capstan sleeve (64) straight up and off the capstan shaft for 3 3/4" speed or allow it to remain on the shaft for 7 1/2" speed. If the capstan sleeve (64) is removed, place it immediately in the "Capstan Storage" well.

Threading The Tape-

1. Place a reel of tape on the right hand spindle and an empty reel on the left hand spindle making sure the reel slots engage the reel pin on the spindles.

2. Unwind about 18" of tape from the reel. Hold a section of tape straight with both hands and drop the tape in the tape slot making sure the dull coated side of the tape faces the rear of the recorder.

NOTE: This recorder uses Type "A" wound tape, i.e. the dull magnetic coated side faces inward on the reel. If the tape to be used is Type "B" (coated side facing outward) the recording will be made at a very low sound level and the playback will almost be inaudible. To change Type "B" to Type "A" wind, rewind the tape in a half twist.

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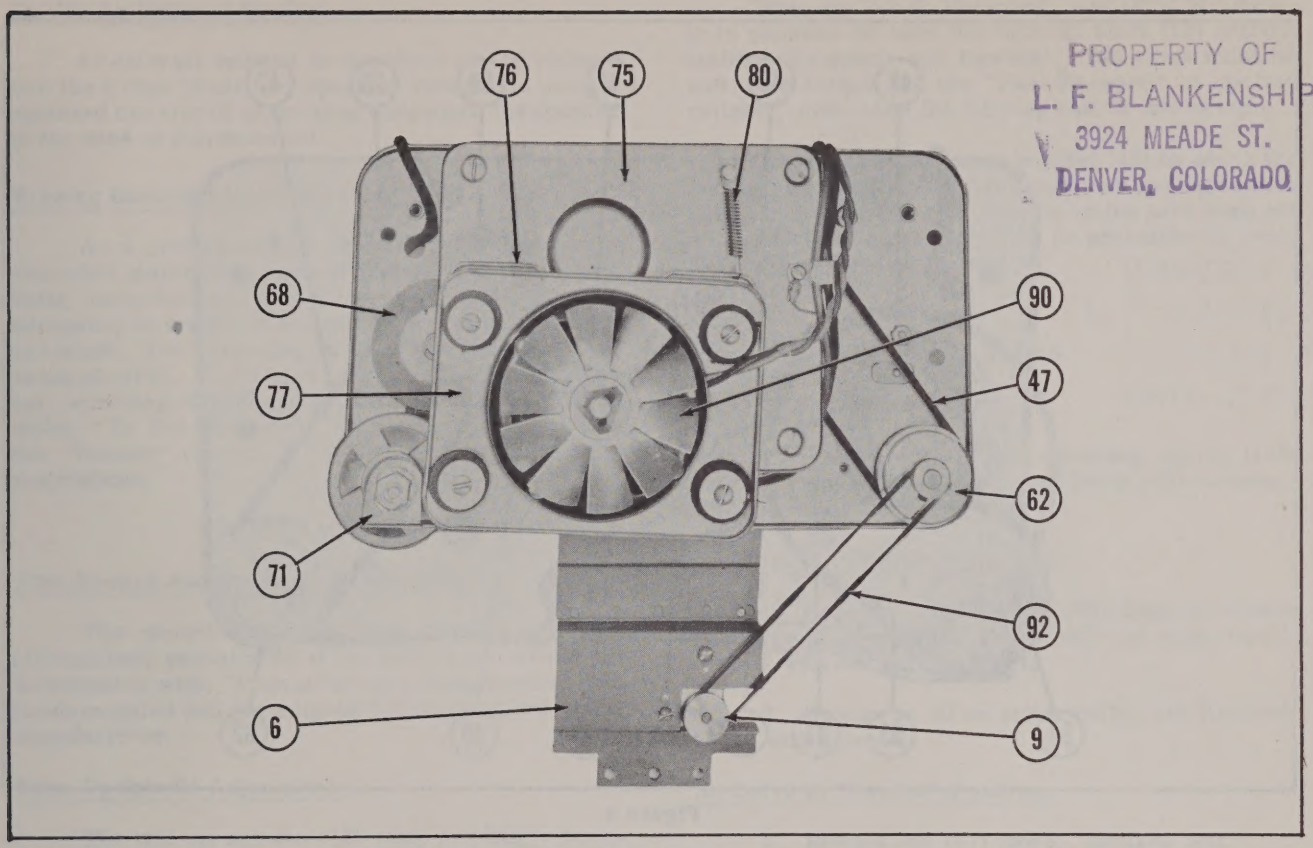

Figure 3

3. Insert the free end of the tape into one of the three radial slots in the hub of the empty reel. Turn the reel several turns until the tape is secured to the reel and all slack is taken up between reels.

To Record From Microphone-

Remove the microphone from its compartment and plug it into the receptacle marked "Microphone". This automatically disconnects the loudspeaker in the case and eliminates any possibility of feedback or howling. Depress simultaneously the selector keys marked "Micro" and "Record" whereupon the Magic Eye "Level Indicator" will glow. Next, slide the "Bass" switch to "in" or "out" depending on the type of response desired. With the switch at the "out" position the bass notes are diminished. The "Treble" control is inoperative during all recording functions and, therefore, requires no adjustment. Now, speak or play into the microphone while turning up the "Volume" control until the Magic Eye "Level Indicator" almost flickers shut. Hold down the "Micro" and "Record" keys while turning the Tape Motion Control (2) to the "Forward" position and the recording is in process.

To Record From Radio Or TV-

Remove the Radio Connecting Cord from its storage compartment. It has a black bakelite plug on one end while the opposite end splits into an insulated wire and a braided wire each equipped with an eyelet lug. The insulated wire should be connected to the insulated voice coil terminal of the radio or TV speaker and the braided wire should be connected to the grounded loudspeaker terminal. For convenience, two alligator clips have been furnished with the DuKane. Insert the black plug into the receptacle marked "Auxiliary". Depress simultaneously the selector keys marked "Aux" and "Record". Slide the "Speaker" switch up to the "on" position and the "Bass" switch "in" or "out" as desired. Advance the recorder "Volume" control to 5 and turn up the volume on the radio or TV until the Magic Eye "Level Indicator" almost closes. Hold down the "Aux" and "Record" selector keys while turning the Tape Motion Control (2) to "Forward" and the recording is in process.

To Record From Phonograph-

The Phono Connecting Cord is stored in the same place and is similar to the Radio Connecting Cord except that it is equipped with a nickel plated plug. Connect the insulated wire of the Phono Connecting Cord to the insulated wire from any crystal or high impediance pickup cartridge and connect the braided wire to the outer braid of the lead from the pickup cartridge. Insert the plug into the receptacle marked "Auxiliary". Slide the "Speaker" switch up to the "on" position and set the "Bass" switch at "in" or "out" as desired. Depress simultaneously the "Aux" and "Record" selector keys and advance the "Volume" control until the Magic Eye "Level Indicator" almost closes when the phonograph is operating. While holding down the "Aux" and "Record" keys turn the Tape Motion Control (2) to "Forward" and the recording is in process.

Dual Track Recording-

The DuKane is a dual track recorder. Only half the tape width is used for each recording track. To record the second track, remove the full reel from the left hand spindle, turn it over and place it on the right hand spindle. Place the empty reel on the left hand spindle and proceed with the recording as before.

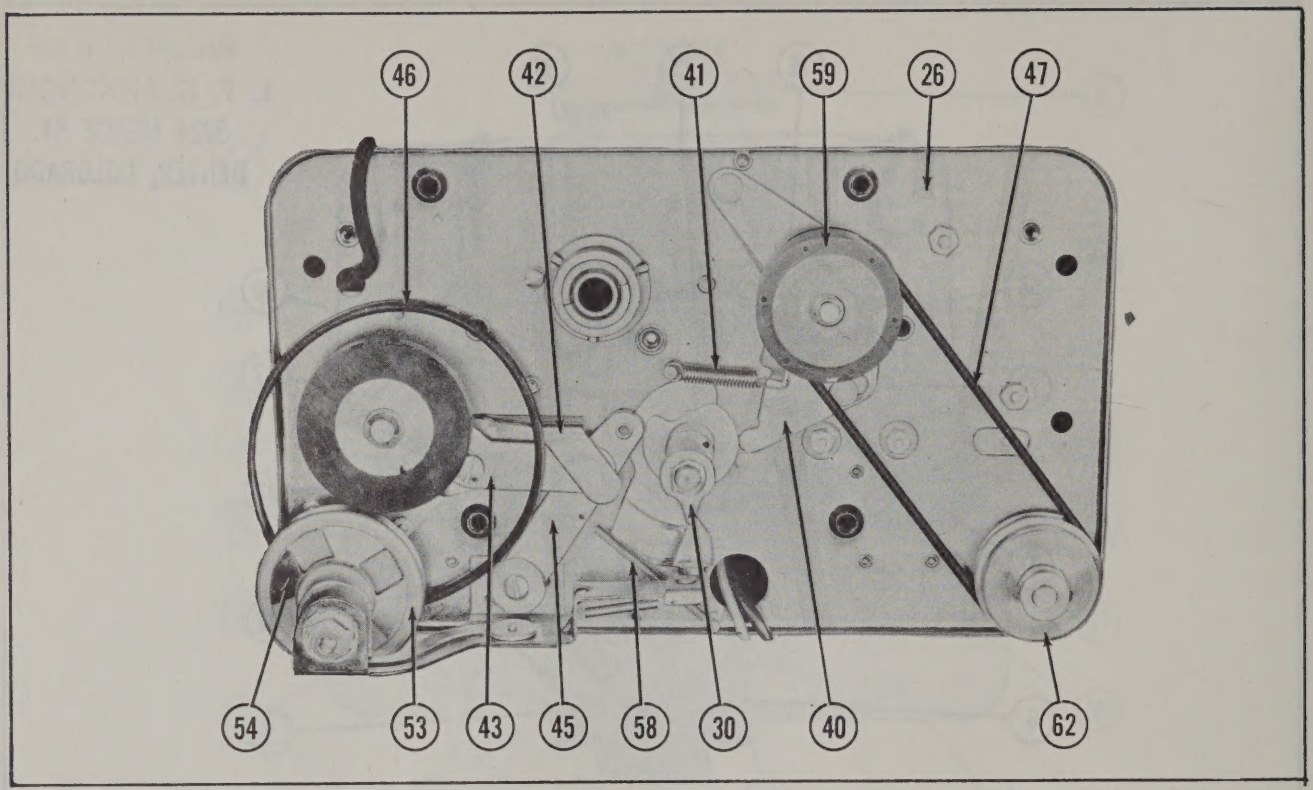

Figure 4

To Play A Recording-

Place a reel of previously recorded tape on the right hand spindle and an empty reel on the left hand spindle. Thread the tape as described under "Threading The Tape". Slide the speaker switch up and the "Bass" switch "in" or "out" as desired. Depress the "Play" selector key and simultaneously turn the Tape Motion Control to "Forward". Adjust the Volume and Treble controls to suit.

Fast Forward-

High-speed forward can be obtained by turning the Tape Motion Control to Fast Forward. This is used primarily in locating a desired portion of a recording in a few seconds.

NOTE: To eliminate any possibility of tape breakage, the Tape Motion Control will not go from the "Fast Forward" position to the "Forward" position without first being returned to the "Stop" position.

Tape Counter-

The Tape Counter can be used in locating various selections on a reel of tape. The counter should be set at zero when a reel of tape is placed on the right hand spindle and the number appearing on the counter at the end of each selection should be noted on the back of the reel carton along with the title of the selection.

To Splice Tape-

1. On the case is mounted a tape splicer for cutting the tape diagonally.

2. Place the two pieces of tape, glossy side up, in the channel so the two broken ends overlap.

3. Run a razor down the groove that crosses the channel at an angle, making sure to cut both pieces of tape.

4. Using a piece of splicing tape, fasten the two ends together while still in the channel. Trim off excess splicing tape.

To Edit Tape-

NOTE: Since it is impossible to edit and splice one track without affecting the other, recordings which are to be edited should be limited to one track only.

To edit, play the recording and cut the tape at the end of the portion you wish to remove. Rewind the tape on an empty reel and cut the tape at the start of the section you wish to remove. Splice together the ends of the remaining tape. For precise editing, listen to the recording and by holding the right hand reel stop the tape at the exact place you wish to edit. Turn the Tape Motion Control to "Stop" and cut the tape at the "Edit Here" mark.

To Monitor With Headphones-

Using a standard two circuit plug, connect any type of high impedance headphones into the receptacle marked "Phones". The headphone leads should connect to the tip and shaft of the plug.

To Use As A Public Address System-

The DuKane can also be used as a public address system. Insert the microphone into the receptacle marked "P. A. Jack" and depress the "Play" selector key. The "Volume" control as well as both "Treble" and "Bass" tone controls are operative so that any volume level and tone characteristic is available.

To Use An External Speaker-

An external speaker or speakers can be plugged into the 8 ohm "Auxiliary Speaker" receptacle using a standard two circuit phone plug whereupon the speaker in the case is disconnected.

Erasing Recorded Material-

As a new recording is made, any previously recorded material is erased from the track that is being recorded on; therefore, no special step is necessary to erase recordings before new recordings are made. The recording on the other half of the tape is not affected. If you wish to erase a recording without recording anything else on the tape, proceed as under "To Record From Microphone" except turn the "Volume" control to "1" and do not plug in the microphone.

ADJUSTMENTS

Play-Record And Erase Head Adjustment-

The record-erase head and bracket assembly (10) has been pre-aligned at the factory and should not be tampered with. When ordering a replacement, both heads mounted and pre-aligned will be supplied by the manufacturer.

Take-Up Spindle Adjustment-

The take-up spindle (13) runs in a single bearing and, therefore, appears to be quite wobbly when compared with the relatively rigid rewind spindle (15). The take-up spindle (13) has two principle functions. These are to take-up the tape after it has passed the heads or, to advance the tape at a high rate of speed when selector control knob (2) is set in "Fast Forward" position.

The diameter of the take-up reel is constantly changing as the tape builds up on the spool and, it is therefore necessary for the reel to rotate at a constant diminishing speed. In this recorder this is accomplished by the use of a slipping clutch. The upper clutch plate (48) is coupled to the flywheel (66) by take-up belt (46) and, power is applied in all positions of the selector control knob (2) except "Stop".

When selector control knob (2) is set in the "Play" position, the clutch actuating arm (71) raises the fast forward drum assembly (53) and, applies pressure against the upper clutch plate (48), thus, transmitting power from the upper clutch plate to the fast forward drum which is coupled to the take-up shaft and bearing assembly (13) through spring washer (54).

The adjustment of the take-up action should be such that tape will not spill from a full take-up reel when the selector control (2) is turned to "Play" from "Stop". The amount of pressure applied against the upper clutch plate (48) by the fast forward drum (53) is controlled by the adjustment of take-up nut (55). It is essential that this pressure never be greater than necessary to keep tape from spilling from a full reel.

When selector knob (2) is turned to "Fast Forward", idler wheel (67) couples flywheel (66) to fast forward drum (53).

When the "Fast Forward" is working properly, it is possible to hold the take-up shaft (13) without stalling the motor and flywheel. But there must be sufficient torque for the "Fast Forward" to operate reliably, even when the take-up reel is full of tape.

The fast forward arm bracket (43) on which the fast forward idler (67) is mounted, and spring washer (54), which controls fast forward action have been set and locked at the factory. It is advisable to avoid changing either one if possible.

PROPERTY OF

TROUBLES

Fails To Erase And Record-

1. Pressure pad arm actuating spring (10B) broken, resulting in the tape not being held in contact with the heads.

No Drive In "Forward" Position-

1. Capstan roller spring (38) loose or broken resulting in the capstan roller (16) not being held in contact with the capstan shaft.

2. Grease or oil on motor pulley and flywheel. Clean with alcohol.

No Drive In "Rewind" Position-

1. Rewind belt (47) loose. Replace belt.

2. Grease or oil on rewind belt (47). Clean belt and pulley grooves with alcohol.

3. Grease or oil on motor pulley, flywheel, and rewind drive wheel (59). Clean driving surfaces with alcohol.

No Drive In "Fast Forward" Position-

1. Take-up spindle assembly not adjusted properly. See "Take-Up Spindle Adjustment".

2. Grease or oil on motor pulley, flywheel and fast forward drive tire (68). Clean driving surfaces with alcohol.

Speed Variation or "Wow"-

1. Check capstan shaft, capstan roller (16), motor pulley, and flywheel (66) for oil or foreign material. Clean these surfaces with alcohol.

Tape Overruns Or Spills When Changing Position Of Selector Control Knob (2) -

1. Brake arm springs (20) loose or broken. Replace defective spring or springs.

2. Brake arm assembly (18 or 19) out of adjustment. These should be adjusted so that there is a clearance of approximately 1/16" between the brake tire and brake arm when selector control (2) is in the "Forward" position. This adjustment is made by loosening screw (23) and turning eccentric washer (25) to the proper position.

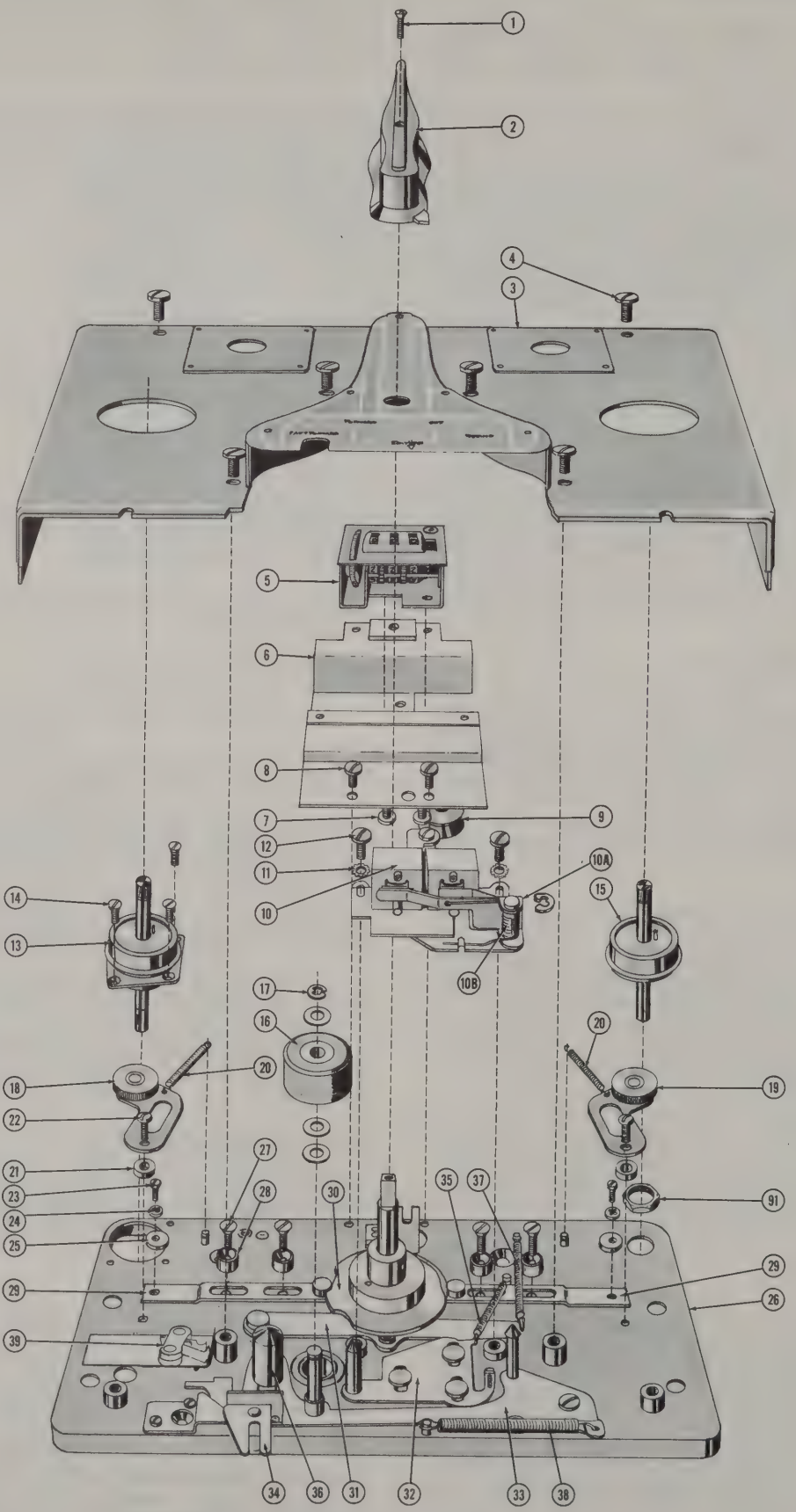

Figure 5. Exploded View Of Parts Above Baseplate.

DENVER, COLORADO

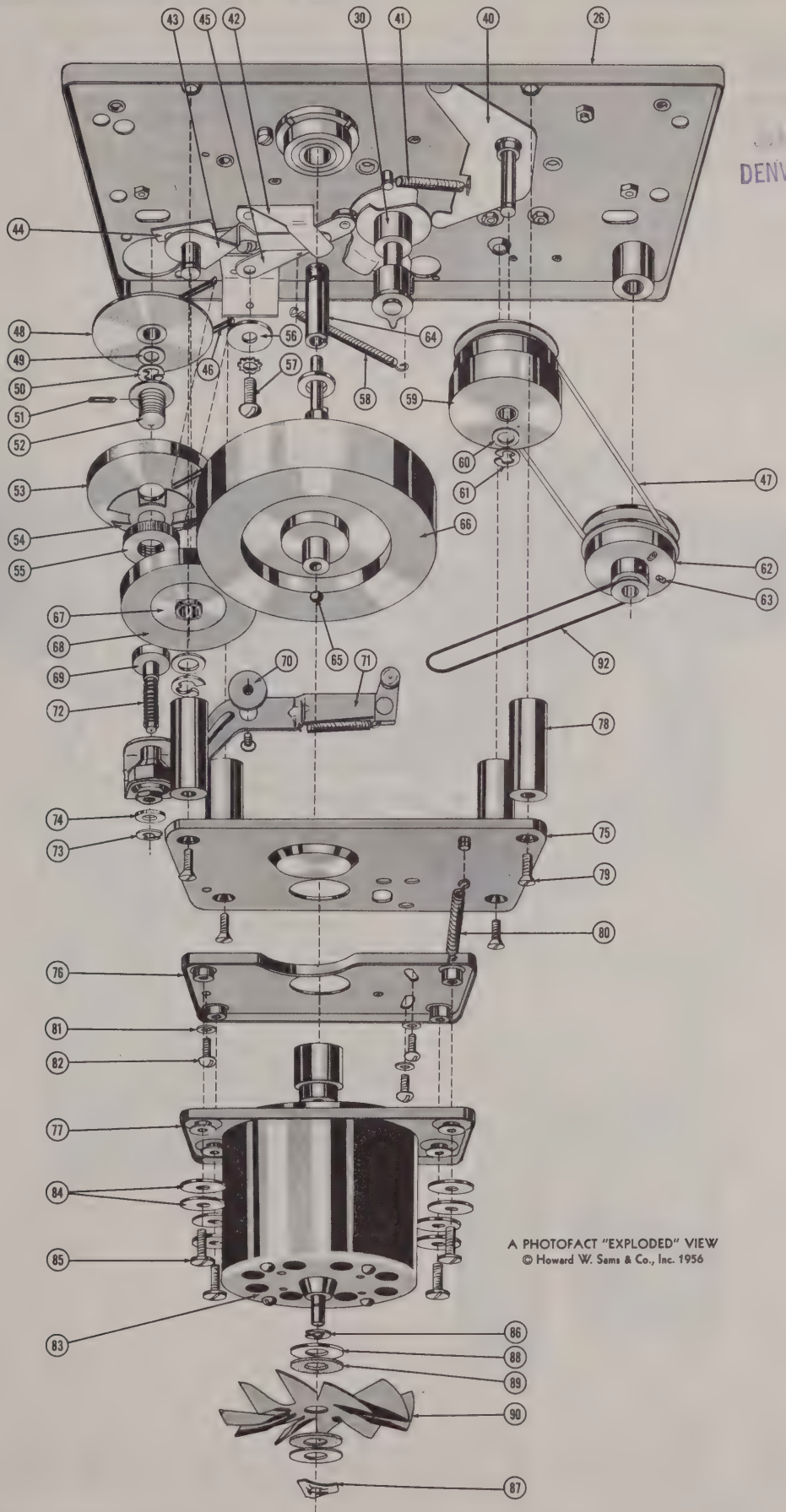

Figure 6. Exploded View Of Parts Below Baseplate.

LUBRICATION

1. This recorder has been adequately lubricated during manufacture with special silicone oil and greases and should, with normal usage, never require additional lubrication, except for the motor (see #2 below). Do not use conventional oils or grease on the mechanism for they will "creep" to the rubber driving parts and cause irrepairable damage.

2. Place 2 or 3 drops of S. A. E. #20 oil on each motor bearing every three months.

CLEANING

The play-record head, erase head, and capstan roller (16) are subject to an accumulation of tape coating oxide which is worn off the tape as it passes these parts. Clean occasionally with a small piece of cotton or soft cloth dipped in alcohol.

After recording at 3 3/4" speed there will be a minute coating of oxide power on the capstan. Before installing the 7 1/2" speed capstan, clean the 3 3/4" capstan with a soft cloth or tissue. Occasionally the 3 3/4" capstan and the inner surface of the 7 1/2" capstan should be thoroughly cleaned with alcohol.

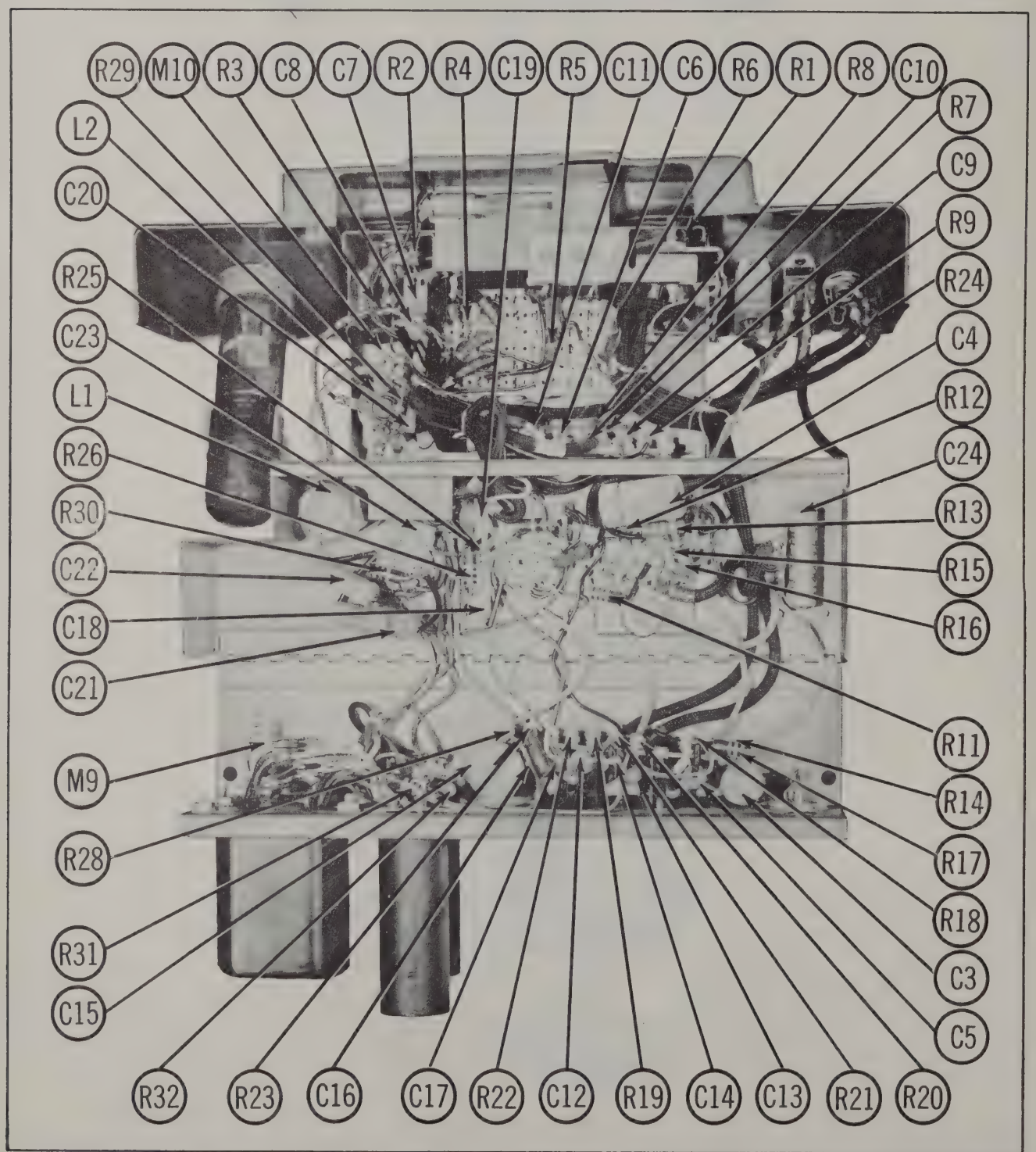

Figure 7. Bottom View Of Model 1A365-A Pre-Amp.

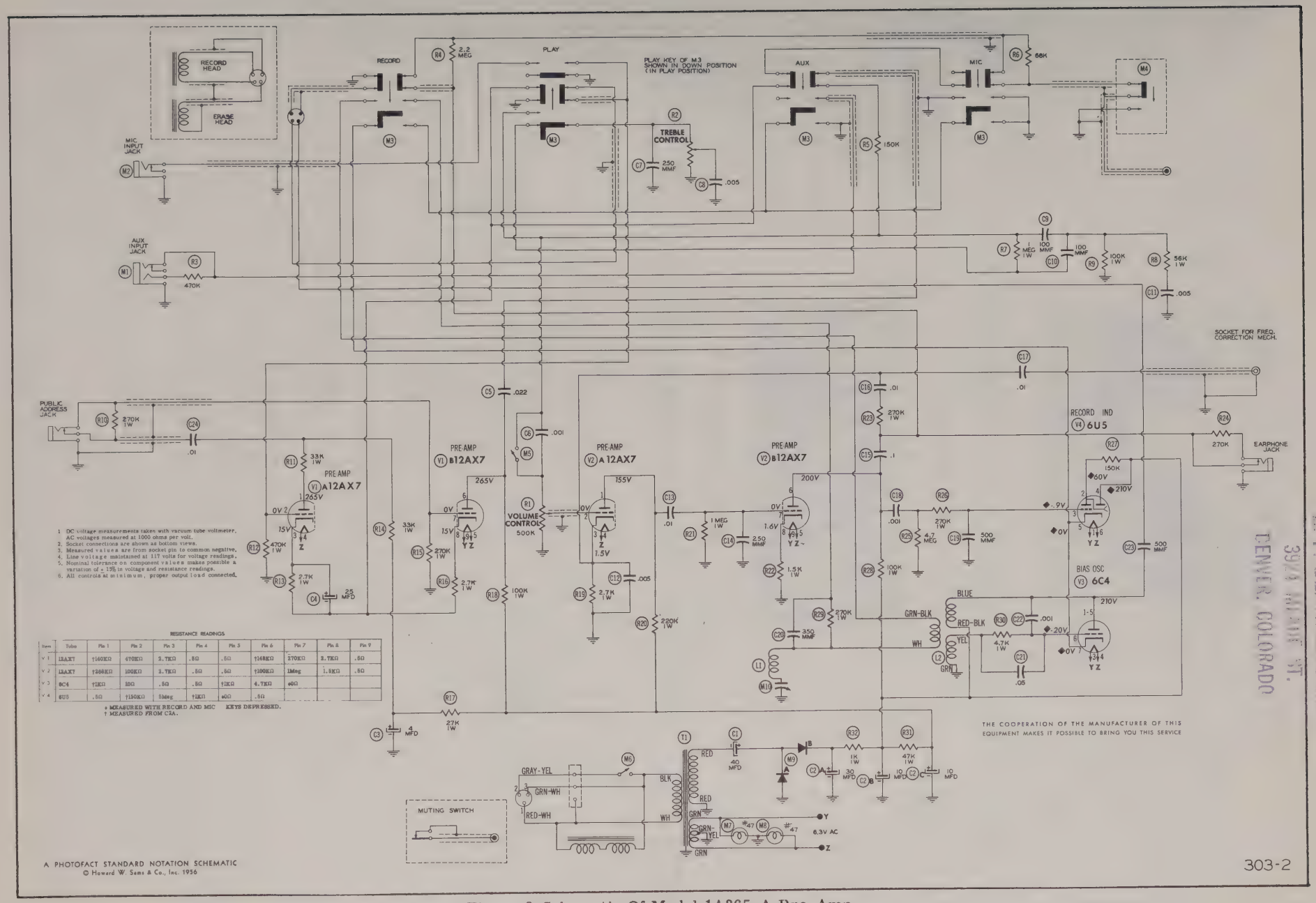
RECORD HEAD
ERASE HEAD
RECORD
PLAY
PLAY KEY OF M3 SHOWN IN DOWN POSITION (IN PLAY POSITION)
AUX
MIC
TREBLE CONTROL
MIC INPUT JACK
AUX INPUT JACK
PUBLIC ADDRESS JACK
VOLUME CONTROL 500K
PRE-AMP V1 6 12AX7
PRE-AMP V1 A12AX7
PRE-AMP V2 A12AX7
PRE-AMP V2 6 12AX7
RECORD IND V4 6U5
BIAS OSC V3 6C4
SOCKET FOR FREQ. CORRECTION MECH.
EARPHONE JACK
MUTING SWITCH
GRAY-YEL
GRN-WH
RED-WH
RED
BLK
WH
GRN
GRN-YEL
BLUE
GRN-BLK
RED-BLK
YEL
6.3V AC
1 DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.
RESISTANCE READINGS
* MEASURED WITH RECORD AND MIC KEYS DEPRESSED.
† MEASURED FROM CRA.
THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1956
303-2

Figure 8. Schematic Of Model 1A365-A Pre-Amp.

U. F. [illegible] SHIP
3924 MAINE ST.
DENVER, COLORADO

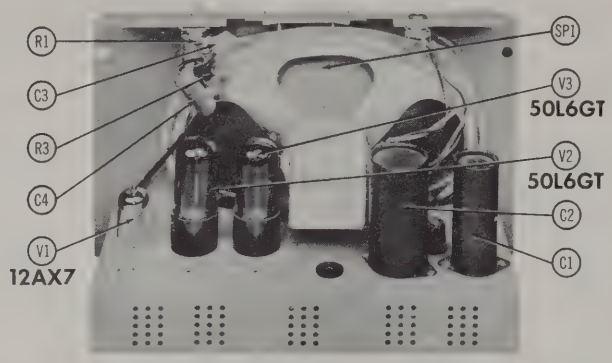

Figure 9. Top View Of Model 1A370-A Power Amplifier.

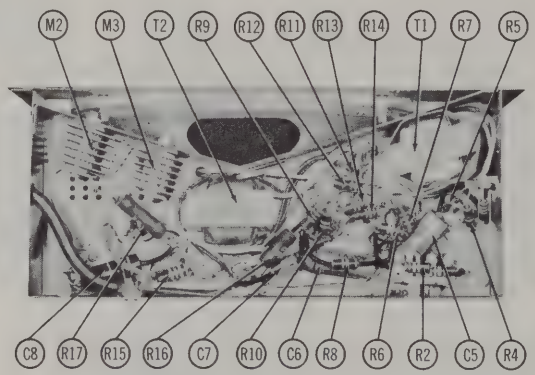

Figure 10. Bottom View Of Model 1A370-A Power Amplifier

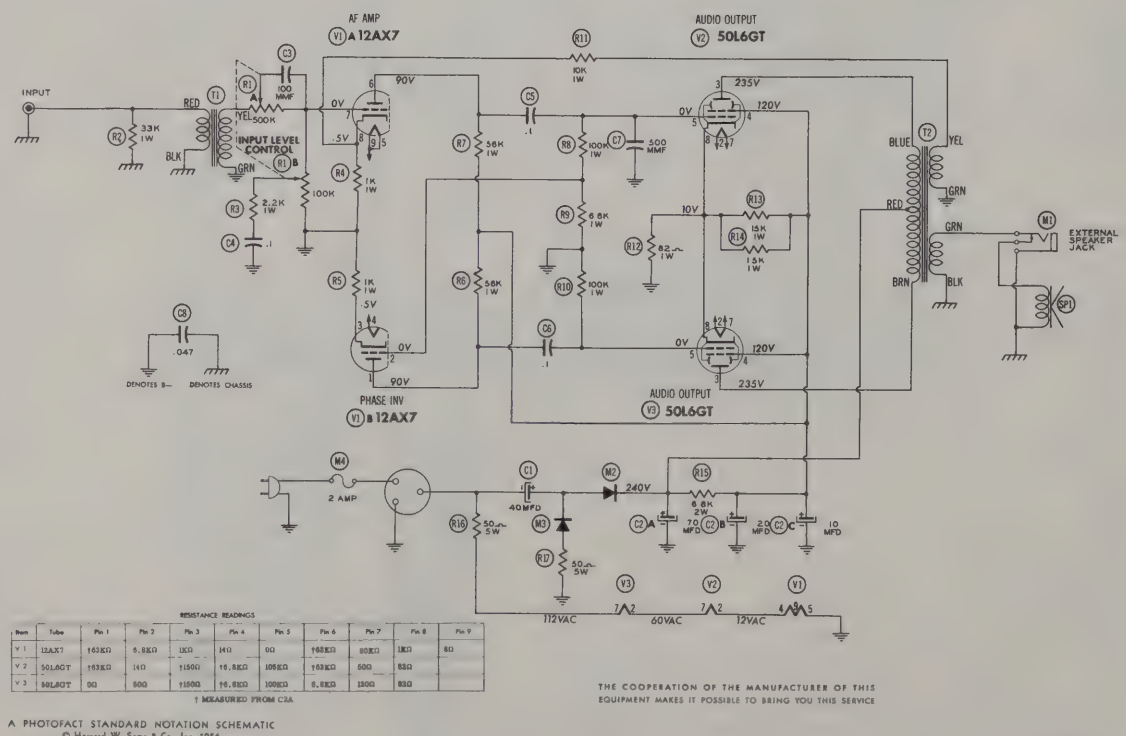

Figure 11. Schematic Of Model 1A370-A Power Amplifier

OWNERSHIP
MEADE ST.
COLORADO

ELECTRICAL PARTS LIST

Model 1A370-A Power - Amp.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1	262-12AX7	12AX7 AF Amp-Phase. Inv.	R6	600-0116-563	Resistor, 56K@1 W.
V2	262-50L6-GT	50L6GT Audio Outputs	R7	600-0116-563	Resistor, 56K@1 W.
V3	262-50L6-GT	50L6GT Audio Outputs	R8	600-0116-104	Resistor, 100K@1 W.
C1	199-2025-406	Elect. Cap., 40MFD. @250V.	R9	600-0116-682	Resistor, 6.8K@1 W.
C2A	199-2935	Elect. Cap., 70MFD. @350V.	R10	600-0116-104	Resistor, 100K@1 W.
C2B		Elect. Cap., 20MFD. @350V.	R11	600-0116-103	Resistor, 10K@1 W.
C2C		Elect. Cap., 10MFD. @350V.	R12	600-0116-820	Resistor, 82Ω@1 W.
C3	199-3001-101	Cap. Ceramic, 100MMF@500V.	R13	600-0116-153	Resistor, 15K@1 W.
C4	199-4021-104	Cap. Paper, .1MFD@400V.	R14	600-0116-153	Resistor, 15K@1 W.
C5	199-4021-104	Cap. Paper, .1MFD@400V.	R15	600-0153-682	Resistor, 6.8K@2W.
C6	199-4021-104	Cap. Paper, .1MFD@400V.	R16	600-1008-500	Resistor, 50Ω@5W.
C7	199-3001-501	Cap. Ceramic, 500MMF@500V.	R17	600-1008-500	Resistor, 50Ω@5W.
C8	199-4037-473	Cap. Molded, .047MFD@600V.	T1	710-1011	Input Transformer
R1A	601-90	Room Balance Control, 500K	T2	710-2048	Output Transformer
R1B		Room Balance Control, 100K	SP1	S12100	Speaker
R2	600-0116-333	Resistor, 33K@1 W.	M1	415-4	Jack Closed Circuit
R3	600-0116-222	Resistor, 2.2K@1 W.	M2	595-11	Selenium Rect., 150M.A.
R4	600-0116-102	Resistor, 1K@1 W.	M3	595-11	Selenium Rect., 150M.A.
R5	600-0116-102	Resistor, 1K@1 W.	M4	320-835-0200	Fuse 2 Amp.

ELECTRICAL PARTS LIST

Model 1A365-A Pre-Amp.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1	262-12AX7	12AX7 Pre-Amp.	R9	600-0116-104	Resistor, 100K@1 W.
V2	262-12AX7	12AX7 Pre-Amp.	R10	600-0080-274	Resistor, 270K@1/2 W.
V3	262-6C4	6C4 Bias - Osc.	R11	600-0116-333	Resistor, 33K@1 W.
V4	262-6U5	6U5 Record Indicator	R12	600-0116-474	Resistor, 470K@1 W.
C1	199-2025-406	Elect. Cap., 40MFD. @250V.	R13	600-0116-272	Resistor, 2.7K@1 W.
C2A	199-2930-00	Elect. Cap., 30MFD. @350V.	R14	600-0116-333	Resistor, 33K@1 W.
C2B		Elect. Cap., 10MFD. @350V.	R15	600-0116-274	Resistor, 270K@1 W.
C2C		Elect. Cap., 10MFD. @350V.	R16	600-0116-272	Resistor, 2.7K@1 W.
C3	199-2037-405	Elect. Cap., 4MFD. @450V.	R17	600-0116-273	Resistor, 27K@1 W.
C4	199-2001-256	Elect. Cap., 25MFD. @25V.	R18	600-0116-104	Resistor, 100K@1 W.
C5	199-4037-223	Cap. Molded, .022MFD. @400V.	R19	600-0116-272	Resistor, 2.7K@1 W.
C6	199-4030-102	Cap. Paper, .001MFD. @600V.	R20	600-0116-224	Resistor, 220K@1 W.
C7	199-3001-251	Cap. Ceramic, 250MMF@500V.	R21	600-0116-105	Resistor, 1 Meg@1 W.
C8	199-4030-502	Cap. Paper, .005MFD. @600V.	R22	600-0116-152	Resistor, 1.5K@1 W.
C9	199-3001-101	Cap. Ceramic, 100MMF@500V.	R23	600-0116-274	Resistor, 270K@1 W.
C10	199-3001-101	Cap. Ceramic, 100MMF@500V.	R24	600-0080-274	Resistor, 270K@1/2 W.
C11	199-4030-502	Cap. Paper, .005MFD@600V.	R25	600-0080-475	Resistor, 4.7Meg@1/2 W.
C12	199-4030-502	Cap. Paper, .005MFD@600V.	R26	600-0116-274	Resistor, 270K@1 W.
C13	199-4020-103	Cap. Paper, .01MFD@400V.	R27	600-0080-154	Resistor, 150K@1/2 W.
C14	199-3001-251	Cap. Ceramic, 250MMF@500V.	R28	600-0116-104	Resistor, 100K@1 W.
C15	199-4021-104	Cap. Paper, .1MFD@400V.	R29	600-0116-274	Resistor, 270K@1 W.
C16	199-4020-103	Cap. Paper, .01MFD@400V.	R30	600-0116-472	Resistor, 4.7K@1 W.
C17	199-4020-103	Cap. Paper. 01MFD@400V.	R31	600-0116-473	Resistor, 47K@1 W.
C18	199-4030-102	Cap. Paper, .001MFD@600V.	R32	600-0116-102	Resistor, 1 K@1 W.
C19	199-3001-501	Cap. Ceramic, 500MMF@500V.	T1	710-4076	Power Transformer
C20	199-3001-351	Cap. Ceramic, 350MMF@500V.	L1	393-3	RF. Coil, 65MH.
C21	199-4021-503	Cap. Paper, .05MFD@400V.	L2	535-4	Bias Osc. Coil
C22	199-4030-102	Cap. Paper, .001MFD@600V.	M1	415-7	Aux. Jack 3CCT
C23	199-3001-501	Cap. Ceramic, 500MMF@500V.	M2	415-4	Mic. Jack Closed CCT.
C24	199-4020-103	Cap. Paper, .01MFD@400V.	M3	680-163	4 Plunger Switch Assy.
R1	601-61	Volume Control, 500K	M4	680-167	Speaker Switch S.P.D.T.
R2	601-61	Treble Control, 500K	M5	680-23	Out-Bass-In S.P.S.T. Switch
R3	600-0080-474	Resistor, 470K@1/2 W.	M6	680-165	On-Off S.P.S.T. Switch
R4	600-0080-225	Resistor, 2.2Meg. @1/2 W.	M7	456-1	Pilot Lamp #47
R5	600-0080-154	Resistor, 150K@1/2 W.	M8	456-1	Pilot Lamp #47
R6	600-0080-683	Resistor, 68K@1/2W.	M9A	595-10	Selenium Rect.
R7	600-0116-105	Resistor, 1Meg@1W.	M9B		Selenium Rect.
R8	600-0116-563	Resistor, 56K@1 W.	M10	199-9025	Variable Cap. Bias Adj.

MECHANICAL PARTS LIST

"The part numbers listed here are for identification purposes when writing or talking about the mechanism". In some cases a manufacturer will supply sub-assemblies rather than individual parts for service replacement. Write DuKane for their current 'Replacement Assembly Parts List for DuKane Drive Mechanism Model #22A10".

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	924-101-0406	#4-40 x 3/8" Oval Phillips Head Screw	43	115-815-00	Fast Fwd. Arm Staking Assy.
2	440-76-01	Knob- Selector Control, Black Nylon	44	147-539-01	Fast Fwd. Mounting Bracket
3	567-224-11	Plate-Rear Top, Royalite	45	108-39-01	Fast Fwd. Lever Arm
4	903-101-0806	#8-32 x 3/8 St. Side Binding Hd. Slotted Screw	46	152-10-00	Take-Up Belt
5	213-1-00	Counter	47	152-2-01	Rewind Belt
6	147-534-04	Counter Bracket	48	115-579-04	Upper Clutch Plate Assy.
7	903-103-0604	#6-32 x 1/4 " Straight Side Binding Slotted Hd. Screw	49	750-99-00037	Washer
8		Counter Bracket Mounting Sc.	50	750-99-00018	Truarc Washer 5133-31
9	578-18-01	Counter Pulley 3/4" Brass	51	564-85-03	Pin
10	115-574-00	Record-Erase Hd. & Bracket Assembly	52	384-5-06	Clutch Plate Hub(Lower)
10A	115-569	Pressure Pad Arm Assembly	53	115-812-01	Fast Fwd. Drum Assembly
10B	650-53	Pressure Pad Arm Actuating Assembly	54	750-99-00042	Spring Washer
11	466-014-08	#8 Lockwasher	55	530-99-00059	Take-Up Nut
12	903-103-0804	#8-32 x 1/4 Bind. Hd. M. Sc.	56	750-01-00024	Washer
13	115-578-07	Take-up Shaft & Bearing Assy.	57	903-103-0804	#8-32 x 1/4 Binder Hd. Screw
14	902-103-0406	#4-40x 3/8 Flat Hd. Screw	58	650-54-00	Brake Arm Spring
15	115-565-04	Rewind Shaft Assembly	59	115-537-04	Rewind Drive Assembly
16	612-2-07	Capstan Roller	60	750-99-00035	Washer
17	750-99-00007	Truarc Washer#5133-31	61	750-99-00007	Truarc Washer #5133-31
18	115-586-04	Brake Arm (Left)	62	578-5-02	Rewind Shaft Pulley
19	115-587-04	Brake Arm (Right)	63	942-141-0803	#8-32x 3/16" Hex. Socket Hd. Sc.
20	650-54-00	Brake Arm Spring	64	630-2-02	Capstan Sleeve
21	634-47-02	Brake Arm Spacer 3/8" Dia.	65	137-14-00	Ball Bearing-.156" Dia.
22	901-103-0806	#8-32 x 3/8 Round Hd. Screw	66	115-566-03	Flywheel Assembly
23	905-103-0604	#6-32 x 1/4 Fil. Hd. Screw	67	758-10-01	Fast Fwd. Wheel(Metal only)
24	466-014-06	#6 I. T Shakeproof Lockwasher	68	758-11-01	Fast Fwd. Wheel(Rubber Tire)
25	750-99-00020	Eccentric .074" Washer	69	115-795-01	Clutch Actuating Pin Assy.
26	567-167-09	Top Plate	70	670-30-03	Clutch Arm Stud
27	902-103-0609	#6-32 x 9/16" Flat Hd. Screw	71	115-580-02	Clutch Actuating Arm Assy.
28	634-112-02	Brake Slide Spacer	72	650-59-00	Clutch Adjustment Spring
29	567-164-03	Brake Slide Plate	73	750-99-00007	Truarc Washer #5133-18
30	115-581-03	Control Shaft Assembly	74	750-01-00021	Washer
31	115-588-03	Detent Arm Assembly	75	567-170-03	Bottom Plate
32	115-591-01	Detent Slide Plate Assembly	76	567-169-03	Motor Swing Plate
33	115-582-04	Capstan Roller Arm Assembly	77	567-166-05	Motor Mounting Plate
34	179-10-02	Switch Release Cam	78	634-41-01	Main Plate Spacers
35	650-58-00	Detent Slide Plt. Spring	79	902-103-4006	#10-32 x 3/8 Flat Hd. Screw
36	564-44-04	Tape Guide Pin	80	650-61-00	Swing Plate Spring
37	650-62-00	Detent Arm Spring	81	750-01-00021	Washer
38	650-55-01	Capstan Roller Spring	82	901-103-4006	#10-32 x 3/8 Round Hd. Screw
39	680-195-01	Speed Equalization Switch	83	115-816-00	Motor & Drive Roller Assy.
40	115-585-01	Rewind Arm Assembly	84	750-01-00024	Washer
41	650-56-00	Rewind & Fast Fwd. Spring	85	903-103-0812	#8-32 x 3/4 Binder Hd. Screw
42	147-553-02	Fast Fwd. Assy. Hanger	86	750-99-00018	Truarc Washer #5133-31
			87	750-99-00019	Truarc Washer #5305-31
			88	750-01-00023	Washer
			89	750-51-00005	Felt Washer
			90	286-2-00	Fan
			91	530-99-00035	Hex. Nut
			92		Counter Drive Belt

PHOTOFACT* Folder

*TRADE MARK

FADA MODELS UH17KD, UH17L1, UH17L2, UH17L2EB, UH17LO, UH21KA, UH21K1, UH21K1LO, UH21L1, UH21L2, UH21L2EB, UH21L2LO

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FADA MODEL UH21K1

TRADE NAME	FADA	MODELS UH17KD, UH17L1, UH17L2, UH17L2EB, UH17L2LO, UH21KA, UH21K1, UH21K1LO, UH21L1, UH21L2, UH21L2EB, UH21L2LO
MANUFACTURER	Fada Radio & Electric Co., Inc., 525 Main Street, Belleville, N. J.	
TYPE SET	Television Receiver	
TUBES	Eighteen	
POWER SUPPLY	110-120 Volts AC-60 Cycle	RATING 1.48 Amp. @ 117 Volts AC
TUNING RANGE-	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)	

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PHOTOFACT* Folder

*TRADE MARK

FADA MODELS UH17KD, UH17L1, UH17L2, UH17L2EB, UH17LO, UH21KA, UH21K1, UH21K1LO, UH21L1, UH21L2, UH21L2EB, UH21L2LO

MODELS

UH17KD, UH17L1, UH17L2, UH17L2EB, UH17L2LO, UH21KA, UH21K1, UH21K1LO, UH21L1, UH21L2, UH21L2EB, UH21L2LO

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 7 push-on type control knobs from front panel of cabinet.
2. Remove 9 wood screws. Remove rear cover.
3. Remove 4 wood screws. Remove antenna terminal bracket.
4. Disconnect speaker leads, picture tube socket, ion trap, centering magnet and HV lead.
5. Remove wing screw holding yoke. Remove yoke.
6. Remove 4 chassis bolts. Remove chassis.
7. Remove 2 speaker nuts. Remove speaker.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet to the right of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 4 phillips head wood screws holding the 2 wood molding strips to each side of the safety glass. Hold glass in place and remove the molding strips and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at its mid-range position and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (A10) located on top of chassis.

FUSES

One fuse is used for horizontal and vertical sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

FADA MODELS UH17KD, UH17L1, UH17L2, UH17L2EB, UH17LO, UH21KA, UH21K1, UH21K1LO, UH21L1, UH21L2, UH21L2EB, UH21L2LO

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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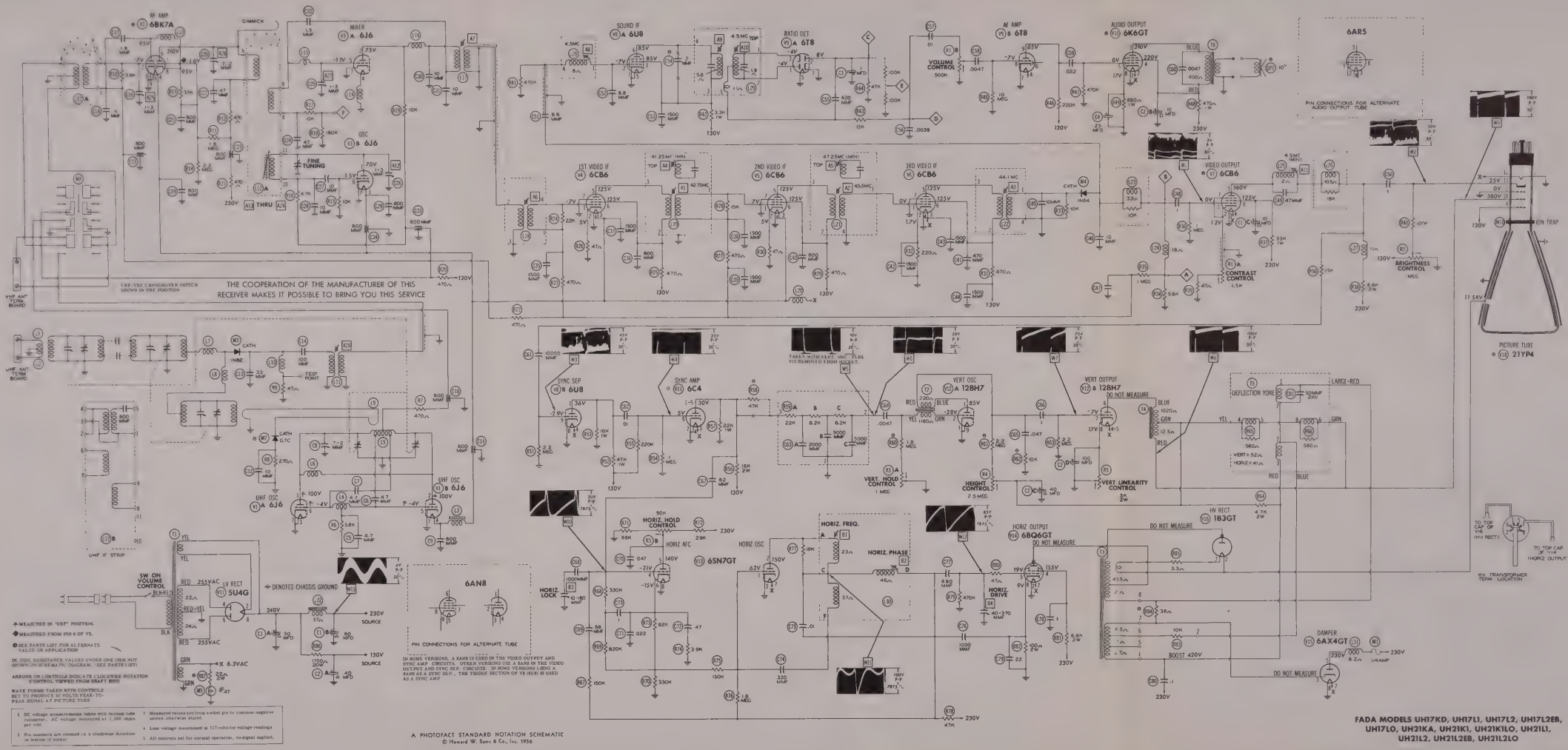
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
FADA MODELS UH17KD, UH17L1, UH17L2, UH17L2EB, UH17LO, UH21KA, UH21K1, UH21K1LO, UH21L1, UH21L2, UH21L2EB, UH21L2LO
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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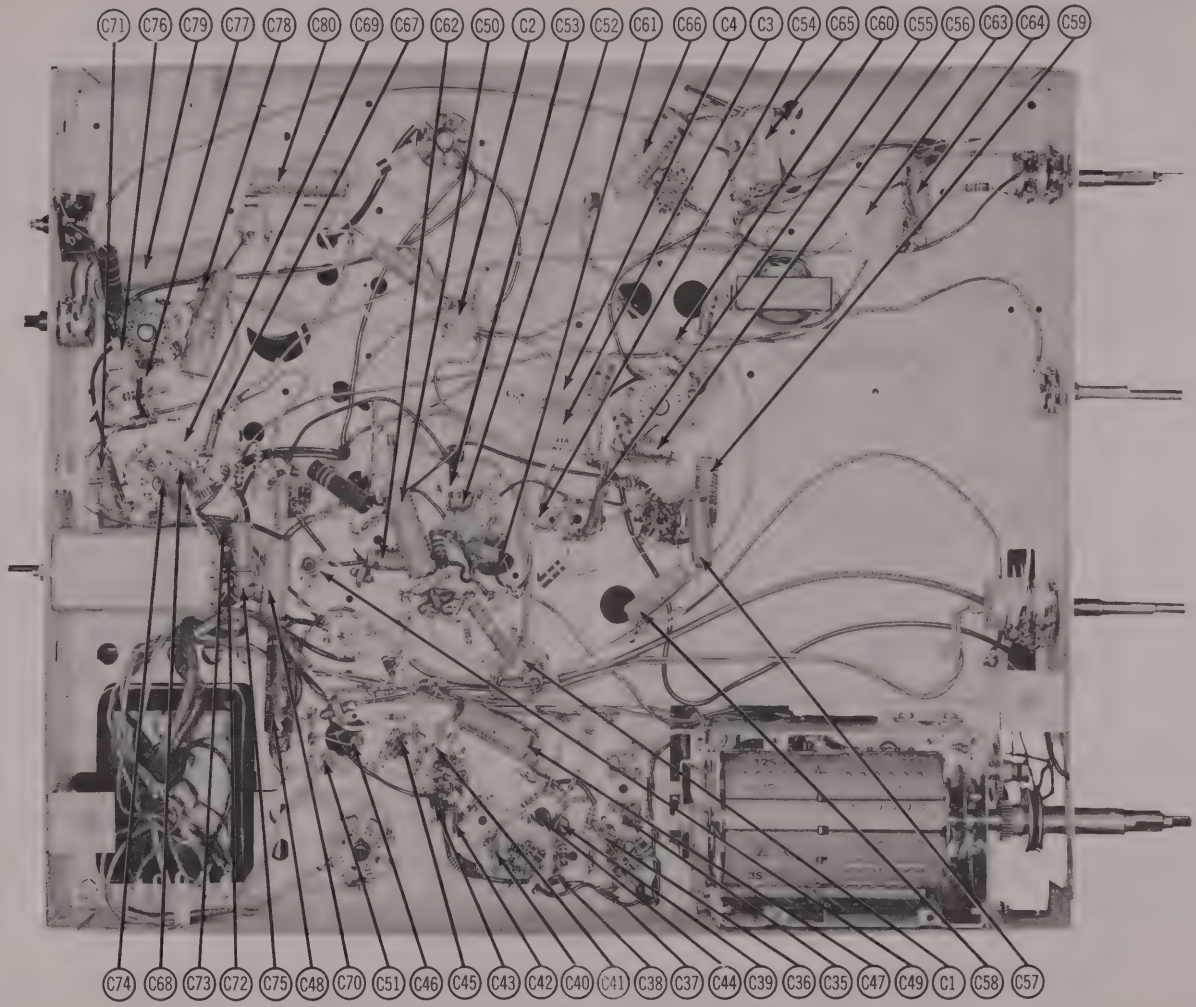
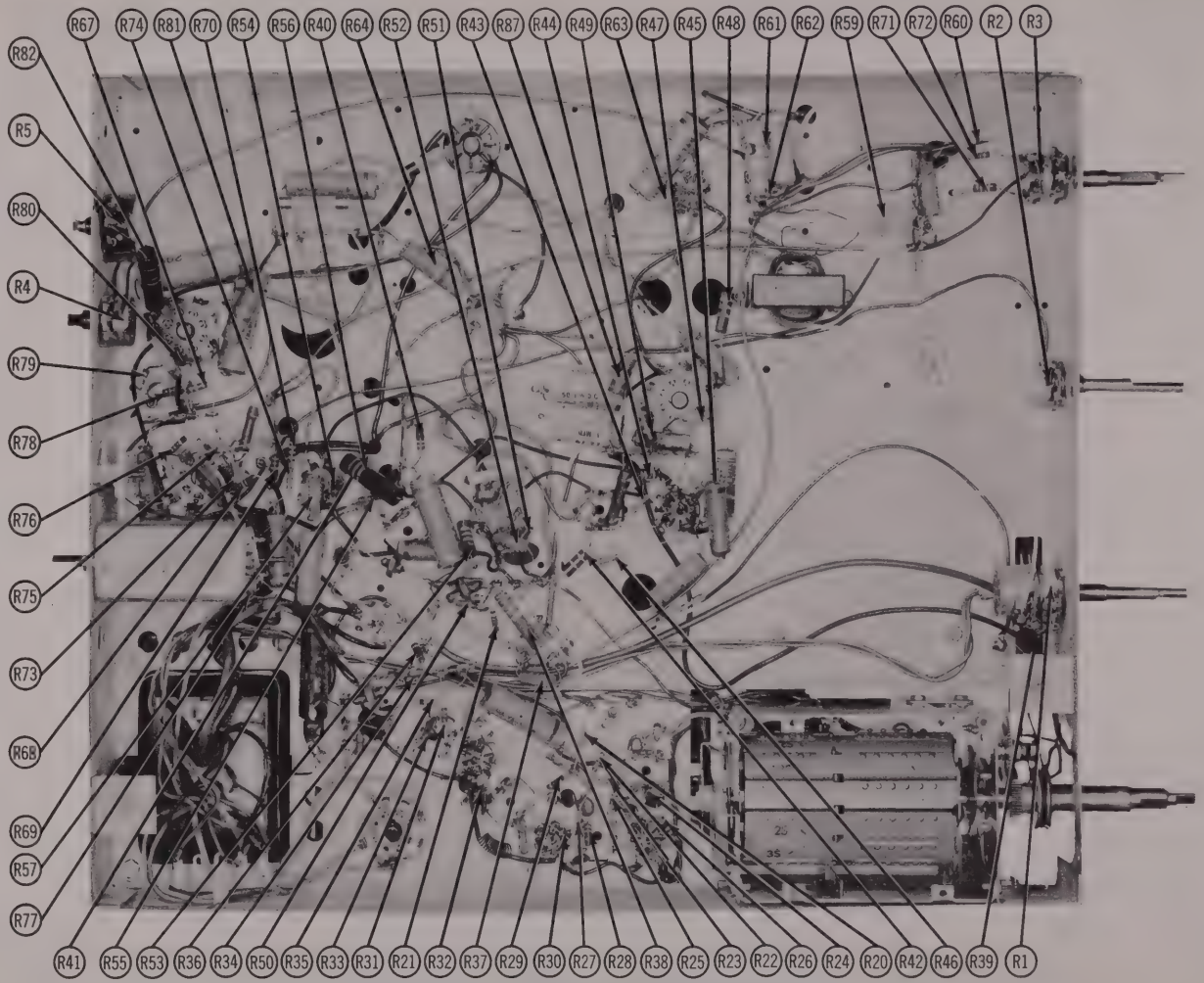
FADA MODELS UH17KD, UH17L1, UH17L2, UH17L2EB, UH17LO, UH21KA, UH21K1, UH21K1LO, UH21L1, UH21L2, UH21L2EB, UH21L2LO



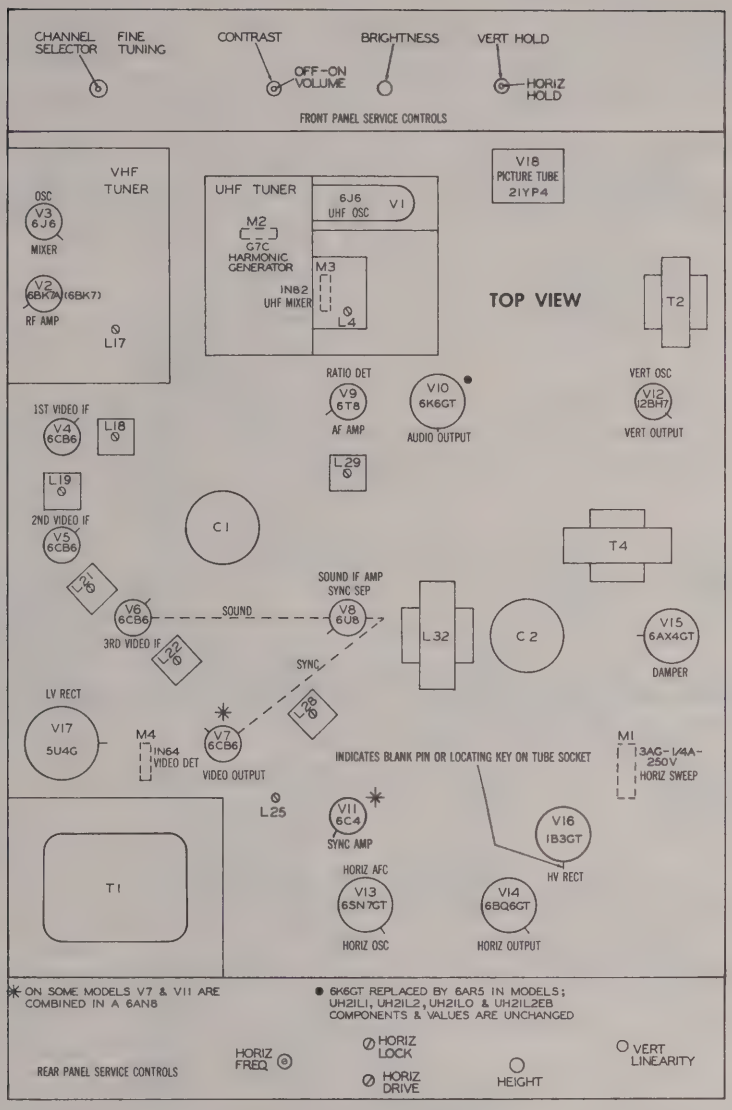
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

FADA MODELS UH17KD, UH17L1, UH17Z12, UH17Z12B, UH17LO, UH21KA, UH21K1, UH21K1LO, UH21L1, UH21L2, UH21L23B, UH21L2LO

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V17

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V7, V18
Has pic, no sound - V8, V9, V10

SYNC FAILURE
No vert. sync - V11, V12
No horiz. sync - V11, V13
No vert. or horiz. sync - V8, V11

SWEEP FAILURE
No raster, has sound - V13, V14, V15, V16, V18 Fuse (M1)
No vertical deflection - V12
Poor vert. linearity or foldover - V12
Poor horiz. linearity or foldover - V13, V14, V15
Narrow picture - V13, V14, V15, V16, V17
Vert. off freq. - V11, V12
Horiz. off freq. - V11, V13

PROPERTY OF
L. F. BLANKENSHIP
3124 MEADE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis. Do not remove the horizontal oscillator tube (V12) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the converter tube (V3) from its socket and replace with a 6Z6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications. Set the contrast control for minimum contrast.
Connect the negative lead of a 4.5 volt bias supply to the ungrounded side of C47. Connect the positive lead to chassis.
Connect a .001MFD capacitor across the vertical input lead of the oscilloscope. If a separate marker generator is used, connect its high side to the chassis apron near the first video IF stage. Leave the low side disconnected. In steps 6 and 7, if necessary, reduce bias from 4.5 volts to 3 volts.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to pin 1 (grid) of 6CB6 (V4). Low side to chassis.	Not used	43.75MC (Unmod)	Any	Use VTVM. DC probe thru 47KΩ to point Ⓐ. Common to chassis.	A1	Attenuate generator output to maintain approximately 2.5 volts on VTVM. Adjust for maximum deflection.
2.	"	"	"	45.5MC	"	"	A2	"
3.	"	"	"	44.1MC	"	"	A3	"
4.	"	"	"	41.25MC	"	"	A4	Increase generator output for usable reading on VTVM. Adjust for MINIMUM deflection.
5.	"	"	"	47.25MC	"	"	A5	Adjust for MINIMUM deflection. Repeat steps 1 thru 5 until readings do not change.
6.	"	"	44MC (20MC Swp)	43.5MC 45.75MC	"	Vert. Amp. thru 15KΩ to point Ⓐ. Low side to chassis.	A1, A2	Use only enough sweep generator output to produce usable pattern on scope. Retouch A2 to place 45.75MC at 75% on response curve as in Fig. 1. Check position of 43.5MC marker, if necessary, slightly retouch A1 to place 43.5MC marker. Retouch A3 to correct tilt. (Fig. 1).
7.	Direct	High side to ungrounded tube shield finaling over converter tube. Low side to chassis.	"	41.25MC 43.5MC 45.75MC 47.25MC	"	"	A6, A7	Adjust A6 and A7 for maximum response similar to Fig. 2, with correct 43.5MC and 45.75MC marker positions. Increase sweep and marker output to observe trap markers. If necessary, retouch A4 (41.25MC) and A5 (47.25MC) for correct trap marker positions.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point Ⓚ to chassis. The junction of these two resistors is alignment point Ⓧ as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	.01MFD	High side to point Ⓧ. Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru 47KΩ to point Ⓚ. Common to chassis.	A8, A9	Adjust for maximum deflection.
9.	"	"	"	"	DC probe thru 47KΩ to point Ⓙ. Common to point Ⓚ.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	.01MFD	High side to point Ⓧ. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru 47KΩ to point Ⓚ. Low side to chassis.	A8, A9	Disconnect stabilizing capacitor (C3). Adjust for curve of maximum amplitude and symmetry similar to Fig. 3.
9.	"	"	"	"	"	Vert. Amp. thru 47KΩ to point Ⓙ. Low side to chassis.	A10	Reconnect stabilizing capacitor (C3). Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLUGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

Set contrast control fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	.01MFD	High side to point Ⓧ. Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru detector (Fig. 5) to pin 11 (cathode) of picture tube. Common to chassis.	A11	Adjust for MINIMUM deflection.

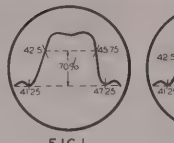


FIG. 1

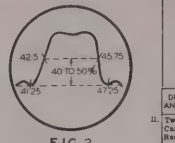


FIG. 2

FIG. 3

FIG. 4

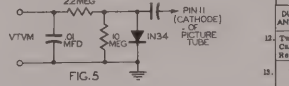


FIG. 5

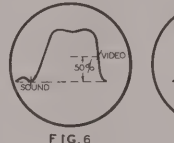


FIG. 6

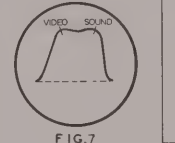


FIG. 7

VHF OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6Z6 in its socket. Leave bias connected as under "Video IF Alignment". Reduce bias to -3 volts.
Complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A13. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel. If adjustment A13 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment screw for each channel that is off frequency. The channel oscillator adjustment screws are reached thru a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch shaft is turned to each channel. Use only enough sweep generator output to provide useable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 130Ω Carbon Resistors	Across antenna terminals with 120Ω to each lead.	201MC (10MC Swp)	205.25MC 209.75MC	13	Vert. Amp. thru 47KΩ to point Ⓐ. Low side to chassis.	A13	Adjust to place sound marker as shown in Fig. 6. Video marker should be at 50%.
			213MC (10MC Swp)	211.25MC 215.75MC	13		A14	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A15	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A16	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A17	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A18	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A19	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A20	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A21	
			591MC (10MC Swp)	67.25MC 71.75MC	4		A22	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A23	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A24	

VHF RF AND MIXER ALIGNMENT

Leave bias connected as under Video IF Alignment. Reduce bias to -3 volts. Use only enough sweep generator output to provide useable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 130Ω Carbon Resistors	Across antenna terminals with 120Ω to each lead.	207MC (10MC Swp.)	205.25MC 209.75MC	13	Vert. Amp. thru 10KΩ to point Ⓨ. Low side to chassis.	A25, A26, A27	Adjust for response similar to Fig. 7.
13.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 7. If markers fall below 70% on any channel, make slight compromise adjustments of A25, A26 and A27 with channel switch set to that channel, then recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			591MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

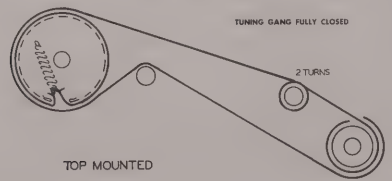
UHF 44MC IF COIL ALIGNMENT

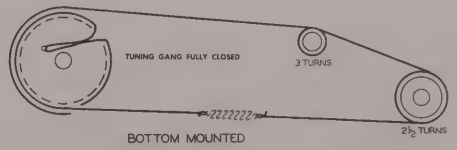
Connect bias as under "Video IF Alignment". Reduce bias to -3 volts if necessary.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	Two 130Ω Carbon Resistors	Across UHF antenna terminals with 130Ω in each lead.	577MC (20MC Swp)	575.25MC (Video) 579.75MC (Sound)	48	Vert. Amp. thru 15KΩ to point Ⓐ. Low side to chassis.	A28	Adjust for response curve similar to Fig. 8. Check all other UHF channels for response curve similar to Fig. 8. If necessary, make compromise adjustment of A28.

UHF OSCILLATOR AND RF ALIGNMENT

These portions of this receiver have been properly aligned at the factory and are very stable. Alignment of these portions should not be required in the field.





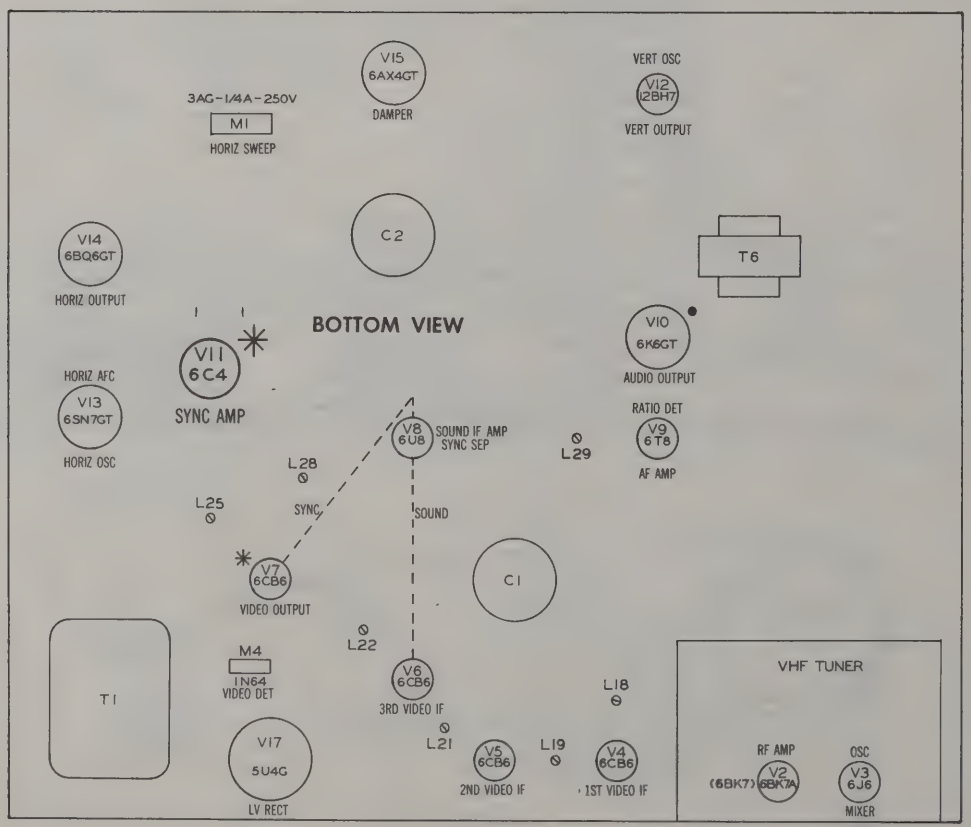
UHF DRIVE CORD STRINGING

RADA MODELS UH172D, UH172J, UH1712, UH1724B, UH171O, UH218KA, UH21K1, UH21K1O, UH2111, UH2112, UH2112B, UH2112O

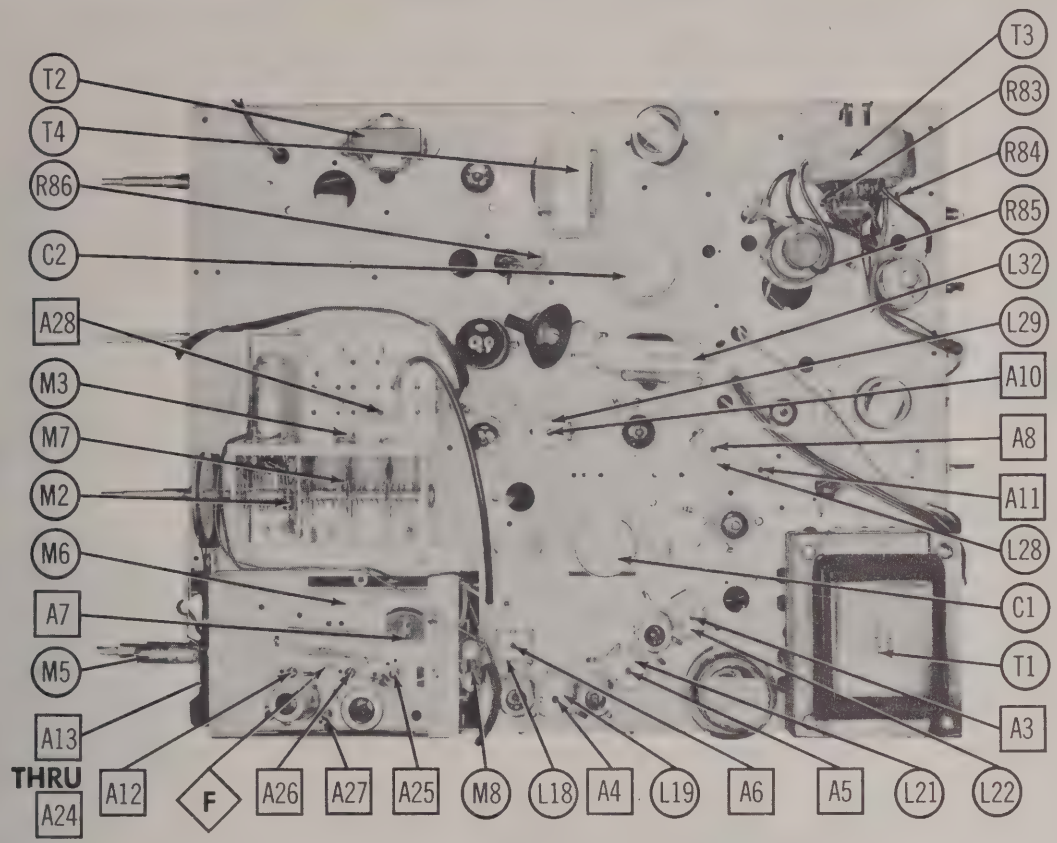
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	*†2. 7KΩ	*†2. 7KΩ	0Ω	. 1Ω	5. 6KΩ	5. 6KΩ	0Ω		
V 2	6BK7A	1Meg	1Meg	0Ω	. 1Ω	0Ω	†1KΩ	1Meg	1Meg	0Ω
V 3	6J6	†6. 5KΩ	†12KΩ	. 1Ω	0Ω	190KΩ	10KΩ	0Ω		
V 4	6CB6	1Meg	47Ω	. 1Ω	0Ω	†2. 2KΩ	†2. 2KΩ	0Ω		
V 5	6CB6	1Meg	47Ω	. 1Ω	0Ω	†2. 2KΩ	†2. 2KΩ	0Ω		
V 6	6CB6	. 2Ω	220Ω	. 1Ω	0Ω	†2. 2KΩ	†2. 2KΩ	0Ω		
V 7	6CB6	1Meg	100Ω	0Ω	. 1Ω	†6. 8KΩ	†33KΩ	100Ω		
V 8	6U8	†25KΩ	470KΩ	†5KΩ	. 1Ω	0Ω	†5KΩ	0Ω	0Ω	2. 2Meg
V 9	6T8	INF	47KΩ	INF	. 1Ω	0Ω	NC	0Ω	10Meg	†220KΩ
V 10	6K6GT	NC	. 1Ω	†950Ω	†500Ω	470KΩ	NC	0Ω	680Ω	
V 11	6C4	†15KΩ	NC	. 1Ω	0Ω	†15KΩ	220KΩ	0Ω		
V 12	12BH7	▲3. 5Meg	2. 5Meg	0Ω	. 1Ω	. 1Ω	▲5. 7KΩ	2. 2Meg	1. 1KΩ	0Ω
V 13	6SN7GT	400KΩ	†47KΩ	0Ω	1. 5Meg	†40KΩ	400KΩ	. 1Ω	0Ω	
V 14	6BQ6GT	NC	0Ω	NC	†6. 8KΩ	470KΩ	TP	. 1Ω	100Ω	TOP CAP ▲44Ω
V 15	6AX4GT	NC	NC	400KΩ	NC	†70Ω	NC	. 1Ω	0Ω	
V 16	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲500Ω
V 17	5U4G	NC	20KΩ	NC	22Ω	NC	24Ω	NC	20KΩ	
V 18	21YP4	0Ω	0Ω	PIN 5 †L. 7KΩ	PIN 10 ▲4. 7KΩ	PIN 11 †200KΩ	PIN 12 . 1Ω			

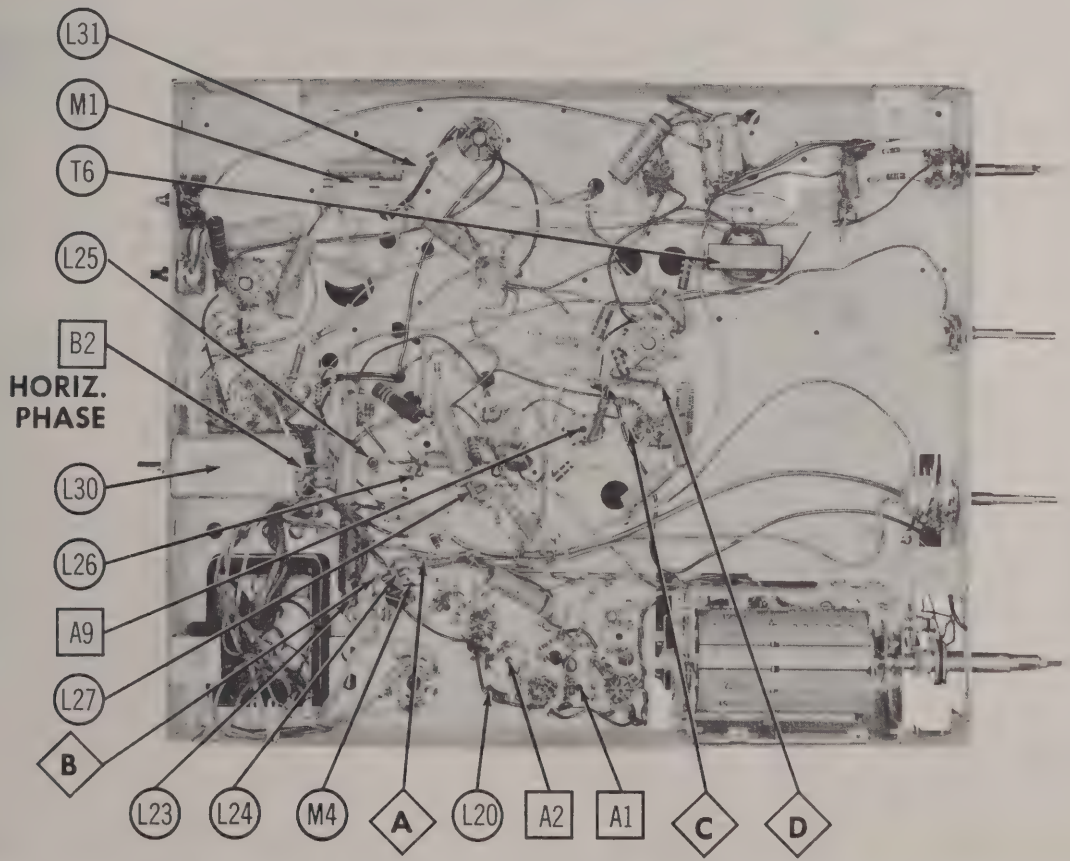
*MEASURED IN "UHF" POSITION.
†MEASURED FROM PIN 8 OF V17.
▲MEASURED FROM PIN 3 OF V15.
NC-NO CONNECTION.
TP-TIE POINT.



TUBE PLACEMENT CHART



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

FADA MODELS UH17KD, UH17L1, UH17L2, UH17L2EB, UH17LO, UH21KA, UH21K1, UH21K1LO, UH21L1, UH21L2, UH21L2EB, UH21L2LO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA — STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
		FADA Part No.		
V1	UHF Osc.	6J6	T9F	
V2	RF Amp.	6BK7A	9AJ	6BK7 used as an alternate.
V3	Mixer-Osc.	6J6	T9F	
V4	1st Video IF Amp.	6CB6	7CM	
V5	2nd Video IF Amp.	6CB6	7CM	
V6	3rd Video IF Amp.	6CB6	7CM	
V7	Video Output	6CB6 *	7CM	
V8	Sound IF Amp. - Sync Sep.	6U8	8AE	
V9	Ratio Det. - AF Amp.	6T8	8K	
V10	Audio Output	6K6GT †	7S	
V11	Sync Amp.	6C4 *	6BG	
V12	Vert. Osc. - Vert. Output	12BH7	8A	
V13	Horiz. AFC - Horiz. Osc.	6SN7GT	8BD	
V14	Horiz. Output	6BQ6GT	8AM	
V15	Damper	6AX4GT	4CG	
V16	HV Rect.	1B3GT	3C	
V17	LV Rect.	5U4G	5T	

* On some models V7 and V11 are combined in a 6AN8.
† 6AR5 substituted on models UH81L1, UH81L2, UH82L0, and UH81L2EB all component values and voltages unchanged.

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA — FADA Part No.	CBS Part No.	GENERAL ELECTRIC Part No.	SYLVANIA Part No.	WESTINGHOUSE Part No.	RETMA BASE TYPE	NOTES
V18	21TP4 17HP4/17RP4	21YP4 21YP4A ① 17HP4/17RP4 17HP4 17HP4B ①	21TP4 21TP4A ① 17HP4/17RP4 17HP4 17HP4B	21YP4 21YP4A ② 17HP4/ 17RP4	21YP4 21YP4A ① 17HP4/17RP4	12L 12L 12L 12L	① Aluminized ② Silver Screen

ELECTROLYTIC CAPACITORS

ITEM No.	RATING — CAP.	VOLT.	REPLACEMENT DATA — FADA Part No.	MALLORY Part No.	PYRAMID Part No.	SANGAMO Part No.	NOTES
C1A	±50	450	22.101		FP385-5	TM-31R7	
B	±80	350			TC72		
C	±10	350				T-180	
C2A	±40	350	22.102		FP431.7	TM-4025	Q-415
B	±10	450				MT-3512	
C	±40	450					
D	100	50					
C3	1	150	22.70	TC40	TD-4-150	FM-1504	
C4	25	50	22.86	TC36	TD-25-50	FM-0525	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING — CAP.	VOLT.	REPLACEMENT DATA — FADA Part No.	CENTRALAB Part No.	ERIE Part No.	MALLORY Part No	NOTES
C5	4.7				N330A-4R7		
C6	4.7				N330A-4R7		
C7	4.7				N330A-4R7		
C8	.7-3			829-3	3115-01-GR5	CT565A	
C9	800			DD-801	831-801	DC-531	
C10	800			MFT-1000			
C11	800			MFT-1000			
C12	10			DD-100	831-100	UC-541	
C13	33			DD-330	831-33Q	UC-5433	
C14	100			DD-101	801-101	UC-531	
C15	800						
C16	1-3			829-3	3115-01-GR5	CT565A	
C17	1.5						
C18	5			TCZ-4R7	NP0A-050	ZT-555	
C19	800			DD-801	831-801	DC-531	
C20	.7-3			829-3	3115-01-GR5	CT565A	
C21	800			DD-801	831-801	DC-531	
C22	47			DD-470	831-470	UC-5447	
C23	800						
C24	47			DD-470	831-470	UC-5447	
C25	1-3			829-3	3115-01-GR5	CT565A	
C26	1-3			829-3	3115-01-GR5	CT565A	
C27	10			TCN-10	N750A-100	NT-541	
C28	10			TCN-10	N750A-100	NT-541	
C29	500						
C30	10			TCZ-10	NP0A-100	ZT-541	
C31	10			TCZ-10	NP0A-100	ZT-541	
C32	1.5			TCZ-5R5	NP0A-5R5	ZT-5515	
C33	800						
C34	800						
C35	1500		27.140	DD-152	831-0015	DC-5215	
C36	800		27.141	DD-801			
C37	1500		27.140	DD-152	831-0015	DC-5215	
C38	1500		27.140	DD-152	831-0015	DC-5215	
C39	1500		27.140	DD-152	831-0015	DC-5215	
C40	500		27.141	DD-501			
C41	470		27.142	DD-471	GP5K-471	UC-5347	
C42	1500		27.140	DD-152	831-0015	DC-5215	
C43	1500		27.140	DD-152	831-0015	DC-5215	
C44	1500		27.140	DD-152	831-0015	DC-5215	
C45	10		27.71	TCZ-10	NP0A-100	ZT-541	
C46	10		27.71	TCZ-10	NP0A-100	ZT-541	
C47	.1	200	13.49	DF-104		PT401	
C48	.1	200	13.49	DF-104		PT401	
C49	47			TCZ-47	NP0-338-470	ZT-5447	
C50	.1	400	13.75	DF-104		PT401	
C51	6.8		27.66	TCZ-6R8	NP0A-6R8	ZT-5568	
C52	6.8		27.66	TCZ-6R8	NP0A-6R8	ZT-5568	
C53	15		27.45	DD-153	831-0015	DC-5215	
C54	3		27.127	TCZ-3R2	NP0A-3R2		Note 1
C55	330		27.135	TCN-330	N750-331-521		
C56	.0039	400	13.71	DF-402	GP3-333-402	PT624	
C57	.01	400	13.72	DF-103	GP3-333-103	PT411	
C58	.0047	400	13.68	DF-472	GP3-333-473	PT6247	
C59	.022	400	13.93	DF-303	817-02	PT4122	

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING — CAP.	VOLT.	REPLACEMENT DATA — FADA Part No.	CENTRALAB Part No.	ERIE Part No.	MALLORY Part No	NOTES
C60	.0047	400	13.68	DF-472	GP3-333-472	PT6247	
C61	10000		17.90	DD-103	831-01	DC-541	
C62	.01	400	13.72	DF-103	GP3-333-103	PT411	
C63A	2000					DC-522	
B	5000		●167.1	●PC-100	●1405-01	DC-525	
C	5000					DC-525	
C64	.0047	400	13.68	DF-472	GP3-333-472	PT6247	
C65	.047	400	13.87	DF-503		PT4147	
C66	.1	400	13.75	DF-104		PT401	
C67	33		17.149	TCZ-33	NP0-337-330		
C68	1000		17.153	DD-102	GP3L-102	UC-531	
C69	68		17.152	TCN-68	N750L-680		
C70	.047	400	13.87	DF-503		PT4147	
C71	.022	400	13.82	DF-303	817-02	PT4122	
C72	.47	200	13.98			PT6947	
C73	.1	400	13.49	DF-104		PT401	
C74	330	500	17.69				
C75	.01	400	13.72	DD-103	GP3-333-103	PT411	
C76	1000	500	17.11			MC8255	
C77	33	500	17.19	DD-681	GP5K-681	DC-5368	
C78	.1	400	13.75	DF-104		PT401	
C79	.22	200	13.91			PT4022	
C80	.1	400	13.75	DF-104		PT401	
C81	50	2000	17.151	DD30-500			

Note 1. Not used in some versions.
● Items C63A, C63B, C63C, R58A, R59B and R59C are combined in one unit.

CONTROLS

ITEM No	RATING — RESISTANCE	WATTS	REPLACEMENT DATA — FADA Part No.	CENTRALAB Part No.	CLAROSTAT Part No.	IRC Part No.	MALLORY Part No.	INSTALLATION NOTES
R1A	1500Ω		52. 79	F1-7		QJ-735*	UF152L	Contrast (Panel)
B	500KΩ			R2-41			UR55A	Volume (Rear)
C	Switch			KS-1			US-26	Attach to R1B.
R2A	1Meg		52. 78	B-69	A47-1Meg-S	QH-137	U-54	Brightness
B	Snaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A.
R3A	1Meg		52. 66	BBB-S10	RTV-S10	QJ-168	UF161	Vertical Hold (Panel)
B	50KΩ						UR54L	Horizontal Hold (Rear)
R4A	2. 5Meg		52. 24	AB-S2	A47-2.5Meg-S	QH-239	EU-545	Height
B	Shaft		Not Req.	AK-1	FKS-1/4	Not Req.	Not Req.	Attach to R4A.
R5A	5000Ω	2	52. 68	VK-139	A43-5000	WK-5000	R5000L	Vertical Linearity (Wire Wound)
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R5A.

*CONCENTRIKIT EQUIVALENT; K-4 KIT, BASE ELEMENTS AND SHAFTS; B17-109, P6-125 (Panel)
B13-125, R1-209 (Rear)
76-1 (Switch)

†CONCENTRIKIT EQUIVALENT; K-2 KIT, BASE ELEMENTS AND SHAFTS; B11-127, P1-126 (Panel)
Bll-123, R1-212 (Rear)

*Universal Replacement (Mallory Exact Duplicate Part No. UF-1601)

RESISTORS

ITEM No.	RATING — OHMS	WATT	REPLACEMENT DATA — FADA Part No.	IRC Part No.	NOTES
R6	5600Ω	½			
R7	470Ω	½		BTA-470	
R8	270Ω	½		BTA-270	
R9	47Ω	½		BTA-47	
R10	3900Ω	½		BTA-3900	
R11	1. 8Meg	½			
R12	470Ω	½		BTA-470	
R13	33KΩ	½		BTA-33K	
R14	1. 2Meg	½			
R15	10KΩ	½		BTA-10K	
R16	47000Ω	½			
R17	10KΩ	½			
R18	180KΩ	½			
R19	10KΩ	½			
R20	470Ω	½	52. 30	BTA-470	Note 2
R21	470Ω	½	52. 30	BTA-470	Note 2
R22	470Ω	½	52. 30	BTA-470	
R23	470Ω	½	52. 30	BTA-470	
R24	22KΩ	½	52. 13	BTA-22K	
R25	470Ω	½	52. 30	BTA-470	
R26	47Ω	½	52. 187	BTA-47	
R27	470Ω	½	52. 30	BTA-470Ω	
R28	15KΩ	½	52. 12		
R29	470Ω	½	52. 30	BTA-470	
R30	47Ω	½	52. 187	BTA-47	
R31	470Ω	½	52. 30	BTA-470	
R32	220Ω	½	52. 5	BTA-220	
R33	10KΩ	½	52. 11		
R34	5600Ω 5%	½	52. 136	BTS-5600 5%	
R35	1Meg	½	52. 33	BTS-1Meg	
R36	1Meg	½	52. 33	BTS-1Meg	
R37	33KΩ	1	52. 69	BTA-33K	
R38	6800Ω	2	52. 641	BTB-6800	
R39	47Ω	2	52. 187	BTB-47	
R40	100KΩ	½	52. 89	BTS-100K	
R41	470KΩ	½	52. 92	BTS-470K	
R42	3300Ω	½	52. 178	BTA-3300	
R43	15KΩ	½	52. 13	BTS-15K	
R44	47KΩ	½	52. 15	BTS-47K	
R45	10Meg	½	52. 96	BTS-10Meg	
R46	220KΩ	½	52. 16	BTS-220K	
R47	470KΩ	½	52. 92	BTS-470K	

ITEM No.	RATING — OHMS	WATT	REPLACEMENT DATA — FADA Part No.	IRC Part No.	NOTES
R48	470Ω	½	52. 380	BTA-470	
R49	680Ω	½	52. 115	BTA-680	
R50	15KΩ	½	52. 13	BTS-15K	
R51	2. 2Meg	½	52. 34	BTS-2. 2Meg	
R52	47KΩ	½	52. 158	BTA-47K	
R53	15K Ω	½	52. 82	BTA-15K	
R54	1Meg	½	52. 33	BTS-1Meg	
R55	220KΩ	½	52. 18	BTS-220K	
R56	15KΩ	½	52. 887	BTB-15K	
R57	22KΩ	½	52. 83	BTA-22K	
R58	47KΩ	½	52. 15	BTS-47K	Note 1
R58A	22KΩ	½		BTS-22K	
B	82000Ω	½	●167.1	BTS-8200	
C	8200Ω	½		BTS-8200	
R60	1. 8Meg	½	52. 208	BTS-1. 8Meg	Note 2
R61	2. 2Meg	½	52. 34	BTS-2. 2Meg	Note 3
R62	10KΩ 5%	½	52. 11	BTS-10K 5%	Note 4
R63	2. 2Meg	½	52. 34	BTS-2. 2Meg	
R64	4700Ω	2	52. 649	BTB-4700	
R65	560Ω	½	52. 68		
R66	560Ω	½	52. 58		
R67	150KΩ	½	52. 90	BTS-150	
R68	330KΩ	½	52. 205		
R69	820KΩ 5%	½	52. 23		
R70	330KΩ	½	52. 205		
R71	68KΩ	½	52. 18		
R72	22KΩ	½	52. 85	BTS-27K	
R73	82KΩ	½	52. 144	BTS-82K	
R74	3900Ω	½	52. 203	BTS-3900	
R75	150KΩ	½	52. 90	BTS-150K	
R76	1. 8Meg	½	52. 208	BTS-1. 8Meg	
R77	15KΩ	½	52. 82	BTS-15K	
R78	47KΩ	½	52. 15	BTS-47K	
R79	470KΩ	½	52. 92	BTS-470K	
R80	47Ω	½	52. 187	BTS-47	
R81	6800Ω	2	52. 651	BTB-6800	
R82	100Ω	2	52. 635	BTB-100	
R83	10KΩ 5%	½	52. 11	BTS-10K 5%	
R84	360 5%	½	52. 43	BTS-36 5%	Note 5
R85	3. 3Ω	½	52. 62	BWJ-3. 3	
R86	1750Ω	10	117. 98	2D-1750	
R87	220	2	52. 43		Note 6

Note 1. Not used in some versions.
Note 2. Some versions use a 1. 5Meg ½W resistor in this application.
Note 3. Some versions use a 1. 8Meg ½W resistor in this application.
Note 4. Some versions use a 8200Ω 1W 5% resistor in this application.
Note 5. Some versions use a 33Ω ½W 5% resistor in this application.
Note 6. Some versions use a 33Ω 2W resistor in this application.
● Items C63A, C63B, C63C, R58A, R59B, R59C are combined in one unit.

TRANSFORMER (POWER)

ITEM No	RATING — PRI.	SEC. 1	SEC. 2	REPLACEMENT DATA — FADA Part No.	Halldorson Part No.	Merit Part No.	RCA TYPE No.	Stancor Part No.	Thordarson Part No.	Triad Part No
T1	117VAC ① 1. 4BA	526VCT 280ADC	5VAC ② 3A	42. 90	PF539 ①			P-8332 ②③		R-61BC ②
	SEC. 3	SEC. 4	SEC. 5							
	6. 3VAC ② 7. 7A									

1 Tape 6. 3V ② 4A winding.
2 Tape 6. 3V ② 1. 2A winding.
3 Parallel and phase 6. 3V ② 7. 1A and . 8A winding for Sec. #3.
4 Parallel and phase 6. 3V ② 6A windings for Sec. #3.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA — FADA Part No	Halldorson Part No	Merit Part No	RCA TYPE No	Ram Part No	Stancor Part No	Thordarson Part No	Triad Part No
T2	Vert. Osc. Trans.	43. 53	B5700	A-3000	209T1	V40SJ	A-8111	24A87	A-10X
T3	Horiz. Output Trans.	43. 92	B9414 *	HVO-21 *	225T1 *	X084 *	A-8220 *	FLY-21 *	D-44 *
T4	Vert. Output Trans.	43. 93	21304	A-3037	223T1	V313	A-8123	26853	A-102X
T5A	Yoke-Horiz (24MH)	37. 386	DF905③	MDF-73 ④	232D1④	V70F25③	DY-15A ④	T-10④	Y-19-1④
B	Vert. (44MH)								

① Drill new mounting hole(s).
② Remove damping capacitor from terminals #3 and #7, use original horizontal damping network, if necessary.
③ Connect horizontal damping network to terminals #1 and #2. Use original horizontal damping network, if necessary.
④ Refer to instructions packed with unit pertaining to horizontal damping network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	8	8	8	8	2	2	8	8
	7	8	2	7	8	2	2	7
	6	7	6	See Note ①	7	6	6	6
	5(NC)	NC	NC	NC	NC	NC	NC	NC
	1	5	1	1	5	1	1	1
Special Notes →		6	6	5	6	6	5	

① If excessive yoke "ringing" occurs, connect a 1000Ω, ½ watt resistor in series with C73 across yoke terminals #1 & #3.
⑤ Remove resistor R76 from circuit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE — PRI.	SEC.	REPLACEMENT DATA — FADA Part No.	Halldorson Part No.	Merit Part No.	Stancor Part No.	Thordarson Part No.	Triad Part No	NOTES
T6	4.5KΩ	3. 3Ω	42. 57	2U07	A-2930	A-3877	24S51	S-3X	

SPEAKER

ITEM No.	RATINGS — SIZE	FIELD	V. C. IMP	REPLACEMENT DATA — FADA Part No	QUAM Part No	NOTES
SP1	10"	PM	3. 3Ω	107. 5R1 107. 47Ω ① 107. 60Ω ②	10A3H	① Speaker used in Models UH81KD, UH81KA, UH81K1, and UH82KL0. ② Alternate PM speaker. ③ Speaker used in Models UH87L1, UH87L2, UH87L2L0, UH87L2EB, UH82L1, UH82L2, UH82L2L0, and UH82L2EB.

COILS (RF-IF)

ITEM No.	USE	DC RES. — PRI.	SEC.	REPLACEMENT DATA — FADA Part No.	MEISSNER Part No.	MERIT Part No.	MILLER Part No.	NOTES
L1	UHF Ant. Coupling Coil	0Ω						
L2	UHF Ant. Coupling Coil	0Ω						
L3	FIL. Choke	0Ω						
L4	UHF Osc. Coil	0GCT						
L5	UHF Osc. Tank Shunt Coil	0Ω						
L6	UHF Osc. Tank Shunt Coil	0Ω						
L7	UHF RF Coupling Coil	0Ω						
L8	UHF Osc. Coupling Coil	0Ω						
L8	UHF Osc. Coupling Coil	0Ω						
L9	UHF Osc. Coupling Coil	0Ω						
L10	RF Choke	1Ω						
L11	UHF IF Output	0Ω	0Ω					
L12	VHF Ant., RF, Mixer Grid, Osc. Coils-UHF IF Strip	0Ω	0Ω					Includes 800MMF Cap.
L13	Neut. Coil	0Ω						
L14	FIL. Choke	0Ω						
L15	Feed Back Coil	0Ω						
L16	RF Coil	0Ω						
L17	Conv. Plate	0Ω	0Ω					
L18	1st Video IF	0Ω	. 1Ω	27. 276	17-4531*	TV-128	6234	
L19	2nd Video IF	. 2Ω	. 2Ω	27. 277	17-4531*	TV-127	6233	Includes 41. 25MC Trap
L20	FIL. Choke	0Ω		27. 50	19-3001	TV-129	6175	6 Microhenry
L21	3rd Video IF	. 2Ω	. 2Ω	27. 278	17-5003	TV-130	6232	Includes 47. 25MC Trap
L22	4th Video IF	. 2Ω	. 2Ω	27. 279	17-4531*	TV-126	6234	
L23	Series Peaking Coil	7. 5Ω		27. 289	19-3135a		6153a	135 Microhenries, wound on 10KΩ resistor
L24	Shunt Peaking Coil	18Ω		27. 236	19-3060		6146	600 Microhenries

PROPERTY OF KENSHIP

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: FADA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L25	4.5MC Trap	2Ω		37.226	20-1004	TV-151	1469	
L26	Series Peaking Coil	10.5Ω		37.290	19-3250♦	TV-185♦	6181♦	245 Microhenries, wound on 18KΩ resistor
L27	Shunt Peaking Coil	11Ω		37.237	19-3250	TV-185	6181	245 Microhenries
L28	Sound IF	8Ω		37.285	17-3495▲	TV-113▲	6203▲	
L29	Ratio Det.	5.8Ω	1.9ΩCT	37.253	17-3497	TV-115	6205	Tertiary Winding=1.1Ω
L30	Horiz. Osc.	23Ω	57Ω	37.219	20-1402 #	TV-162#	6183#	Waveform Winding= 4.6Ω
L31	RF Choke	8.2Ω		37.288	19-1005		4612	10 Microhenries, IRC Part #CL-1

* Detune trap & drill mounting holes.
■ Drill mounting holes.
▲ Parallel with 10KΩ resistor.
♦ Parallel with 18KΩ resistor.
▲ Use one winding only.
Reverse coil mounting in can.

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA: FADA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L32	.160ADC	57Ω	1.92HY	42.91	C5030	C-2974	C-2325	26C43 ①	C-21X ①

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA: FADA PART No. FUSE	FADA PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG P/T	1/4A 250V	122.32		318.250 (3AG P/T-1/4A)		GJV-1/4	

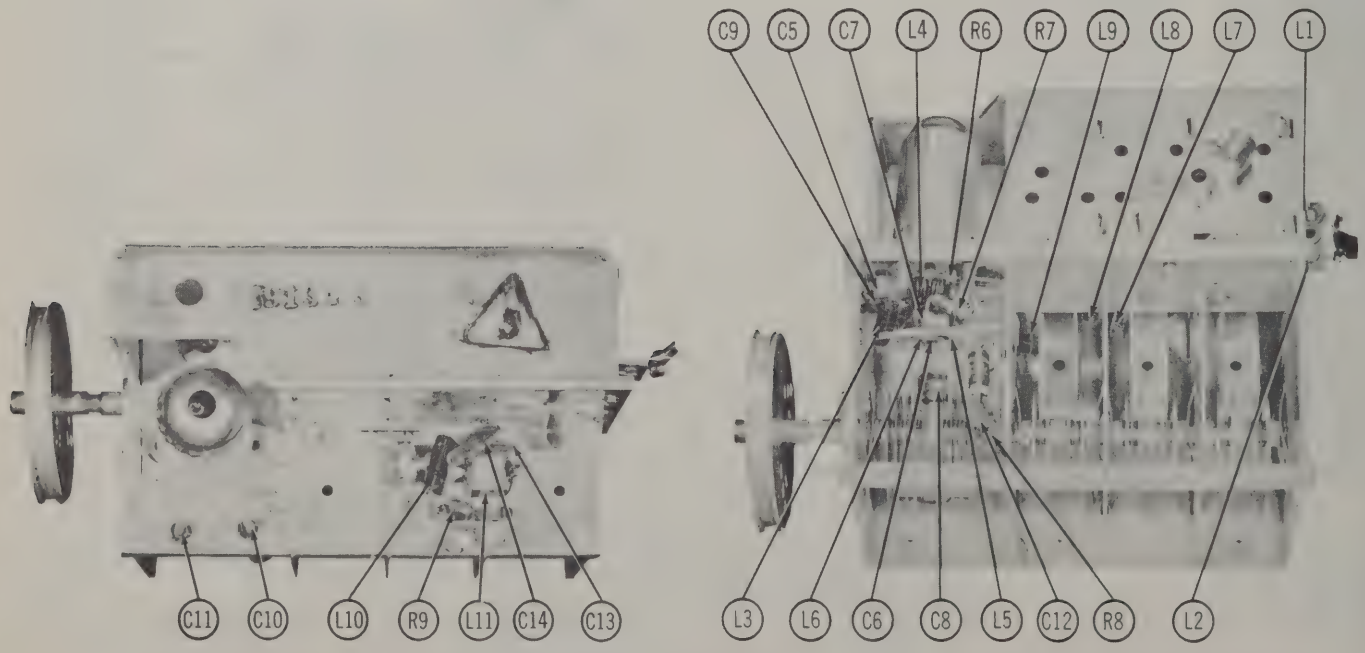
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: FADA PART No.	SYLVANIA PART No.	NOTES
M2	G7C *		1N109	Harmonic generator
M3	1N82		1N82	UHF Mixer
M4	1N64		1N60	Video Detector

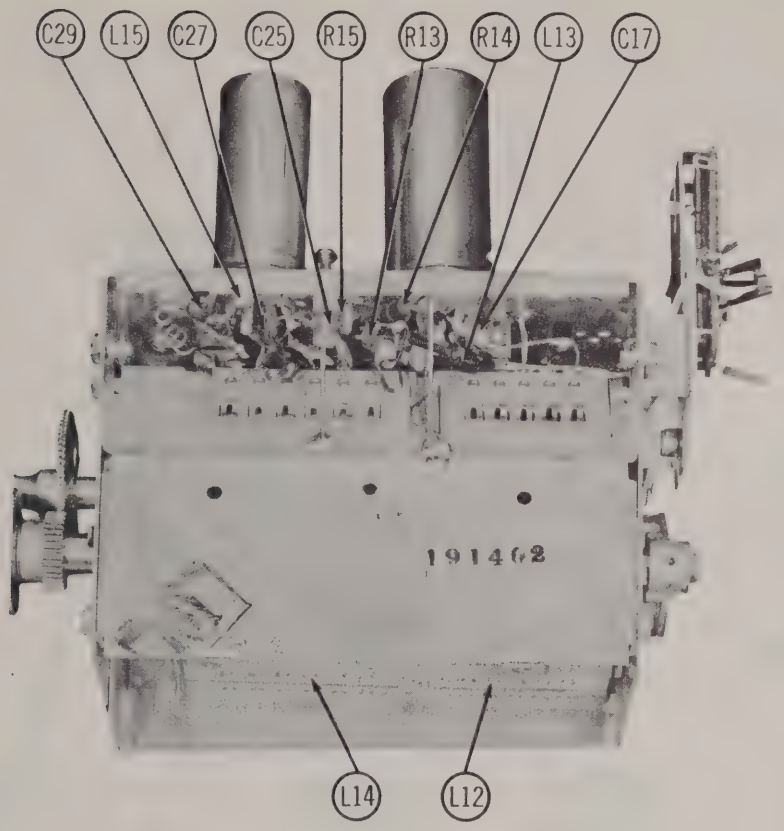
* Some versions may use type G7B crystal diode in this application.

MISCELLANEOUS

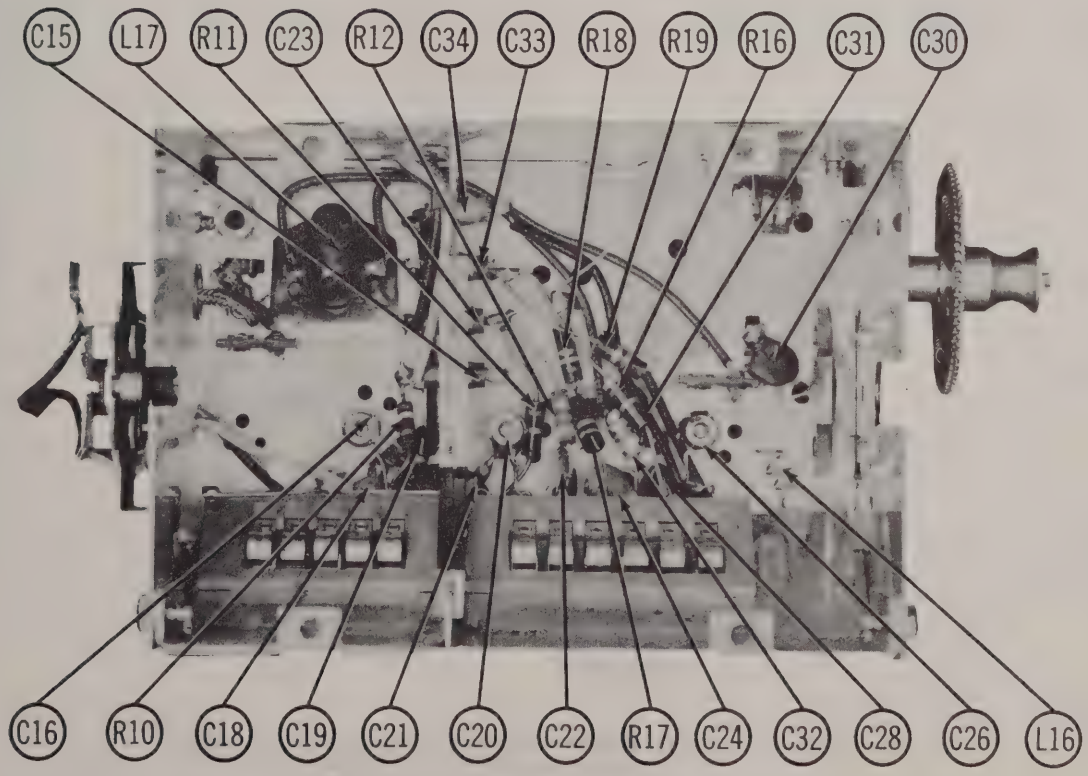
ITEM No.	PART NAME	FADA PART No.	NOTES
M5	Dial Light		#47
M6	Tuner	42.78A	VHF
M7	Tuner	42.79	UHF
M8	Switch		VHF-UHF (Slide Type)
M9	Centering Device	112.37	
M10	Ion Trap	112.39	
B3	Trimmer Cap.	132.14	Dual Trimmer, horizontal lock (10-160MMF) and horizontal drive (40-370MMF)
B4			



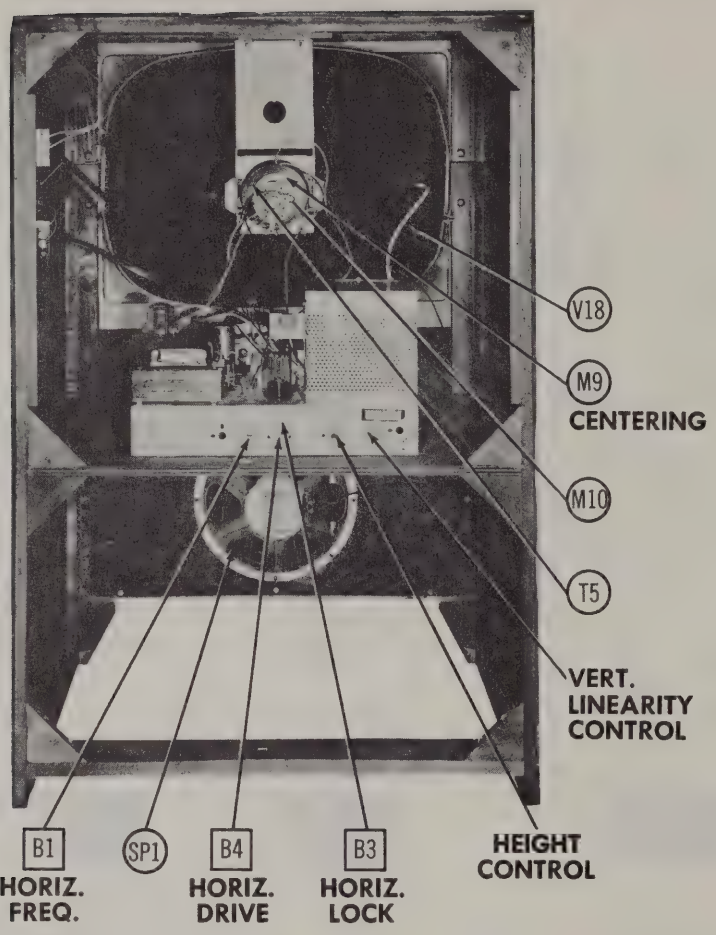
UHF TUNER



VHF TUNER-RIGHT SIDE



VHF TUNER-BOTTOM VIEW



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Preset horizontal lock trimmer (B3) one turn counter clockwise from tight and the horizontal drive trimmer (B4) two turns counter clockwise from tight.

Turn the set on and tune in a TV station, preferably a test pattern.

A. HORIZONTAL FREQUENCY ADJUSTMENT

1. Rotate the horizontal hold control over its entire range. If picture does not remain in sync over most of its range, adjust the horizontal frequency slug (B1) for best sync .

2. If unable to adjust B1 for proper horizontal hold range, adjust the horizontal phase slug (B2) counter clockwise a few turns and repeat step 1. Picture should remain in horizontal sync, if not, continue with "Horizontal Phase Adjustment".

B. HORIZONTAL PHASE ADJUSTMENT

1. Short together terminals "C" and "D" of the horizontal oscillator coil (L31).

2. Set the horizontal hold to its maximum counter clockwise position.

3. Adjust B1 until picture just locks in horizontally.

4. Remove short from terminals "C" and "D" of L31. If picture loses sync with short removed, adjust B2 clockwise until picture falls into sync.

5. Connect the vertical input lead of an oscilloscope to terminal "C" of L31. Adjust the phase slug (B2) until broad and narrow peaks are of equal amplitude as shown in Fig. 8. While adjusting B2 keep the picture in sync by turning the horizontal hold control clockwise. Disconnect scope from receiver.

6. Set the horizontal hold control fully clockwise and adjust B1 until picture remains in sync while switching off channel and back. With the horizontal hold control at mid-position the picture should fall in sync when switching off channel and back again.

C. HORIZONTAL LOCK ADJUSTMENT

1. Set the horizontal hold control fully clockwise, switch off channel and back again. Picture should remain in sync.

2. If not slightly, adjust B1 clockwise until picture falls out of sync with diagonal lines sloping to the left.

3. Turn the horizontal hold control counter clockwise, if more than three bars are present just before picture falls in sync, adjust the horizontal lock trimmer (B3) clockwise. If less than two bars are present, adjust B3 counter clockwise. Picture should now remain in sync while rotating the horizontal hold control over its full range and switching off channel and back again.

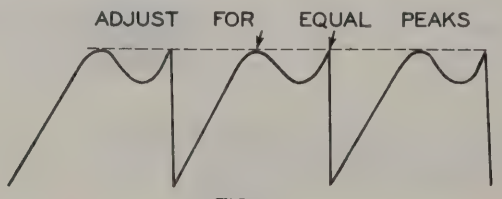


FIG. 8

PHOTOFACT* Folder

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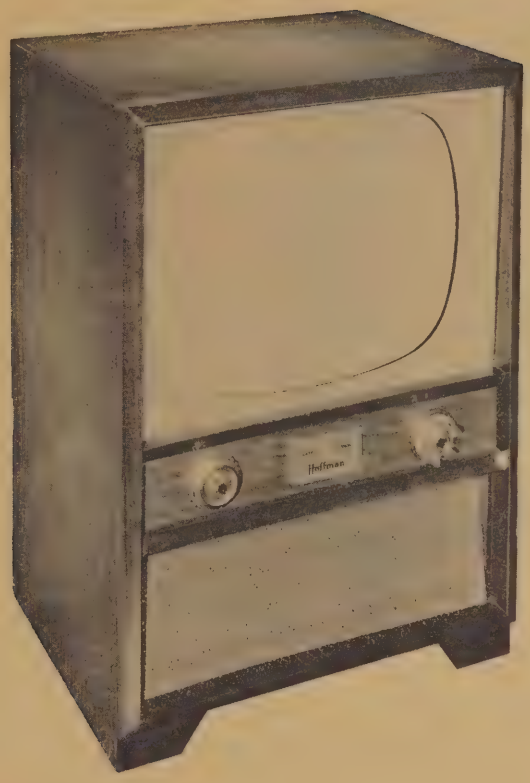

HOFFMAN MODELS 24B197, U, U2, 24B371, U, U2, 24B7325, U, U2, 24M196, U, U2, 24M370, U, U2, 24P372, U, U2, 24P733S, U, U2, 24U211-5, U, U2, 24W196, U, U2, 24W370, U, U2 (Ch. 413-24, 414-24)

HOFFMAN MODEL 24M370

TRADE NAME	HOFFMAN	MODELS	CHASSIS
		24B197, U, U2, 24B371, U, U2, 24M196, U, U2, 24M370, U, U2, 24P372, U, U2, 24W196, U, U2, 24W370, U, U2	413-24
		24B732S, U, U2, 24P733S, U, U2, 24U211-5, U, U2	414-24
MANUFACTURER	Hoffman Radio Corp., 6200 S. Avalon Ave., Los Angeles 3, Calif.		
TYPE SET	Television Receiver		
TUBES	Twenty-Two		
POWER SUPPLY	110-120 Volts AC-60 Cycle	RATING	2.06 Amp. @ 117 Volts AC
TUNING RANGE-	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

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*TRADE MARK

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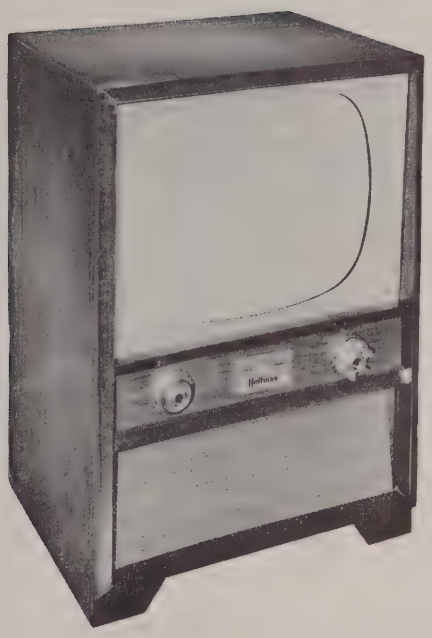

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from front panel of cabinet.

2. Loosen 6 wood screws and remove 1 metal screw . Remove rear cover.

3. Disconnect speaker plug.

4. Remove 4 chassis bolts. Remove 2 wood screws holding chassis braces to cabinet. Remove chassis.

5. Remove 4 wood screws. Remove speaker.

MODELS	CHASSIS
24B197, U, U2, 24B371, U, U2, 24M196, U, U2, 24M370, U, U2, 24P372, U, U2, 24W196, U, U2, 24W370, U, U2	413-24
24B732S, U, U2, 24P733S, U, U2, 24U211-5, U, U2	414-24

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one a time, thru the small hole in the cabinet to the right of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 3 wood screws holding plastic strip at the top edge of safety glass. Remove plastic strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

SPECIAL ADJUSTMENTS

A. AGC Control Adjustment

The AGC control (R3) is located on front panel of the chassis. Adjust R3 for MINIMUM snow in the picture.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit is located on the front panel of chassis. Adjust the horizontal hold control until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (A3) located on top of chassis.

CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

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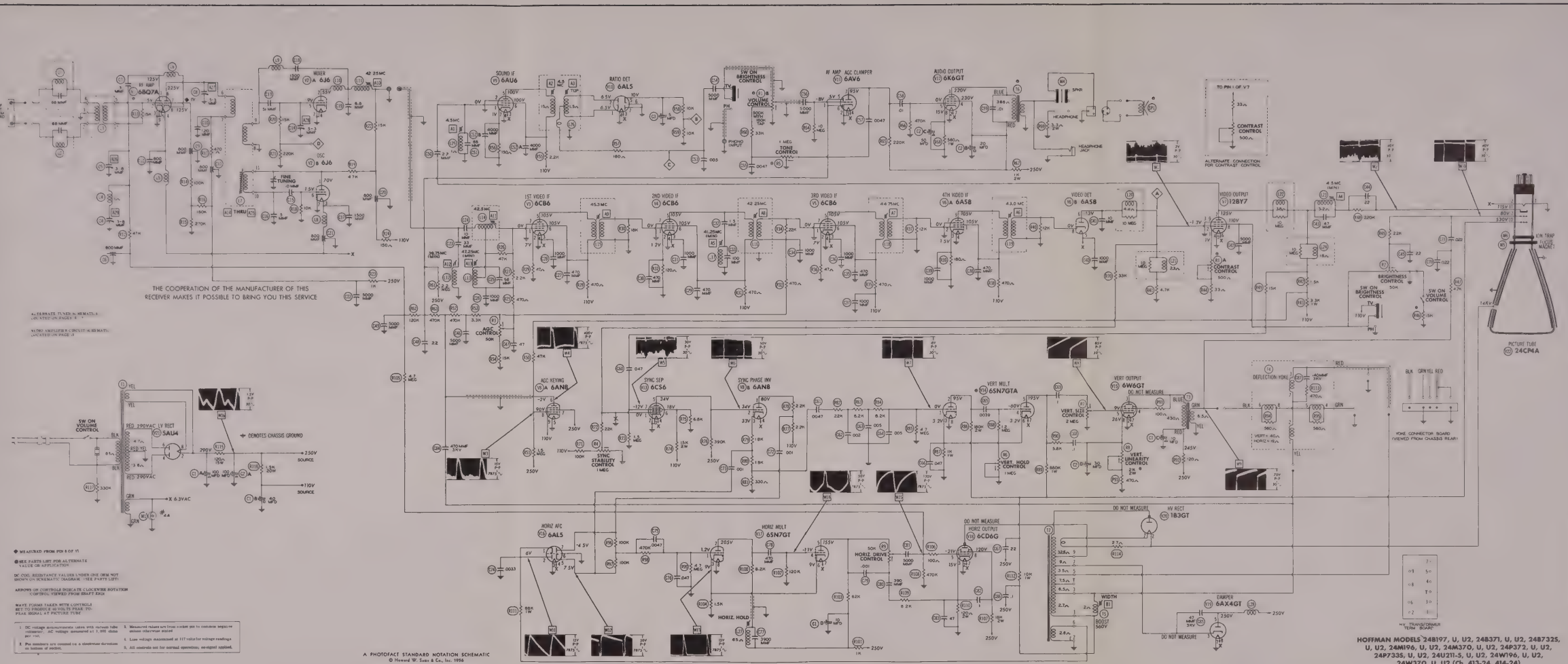
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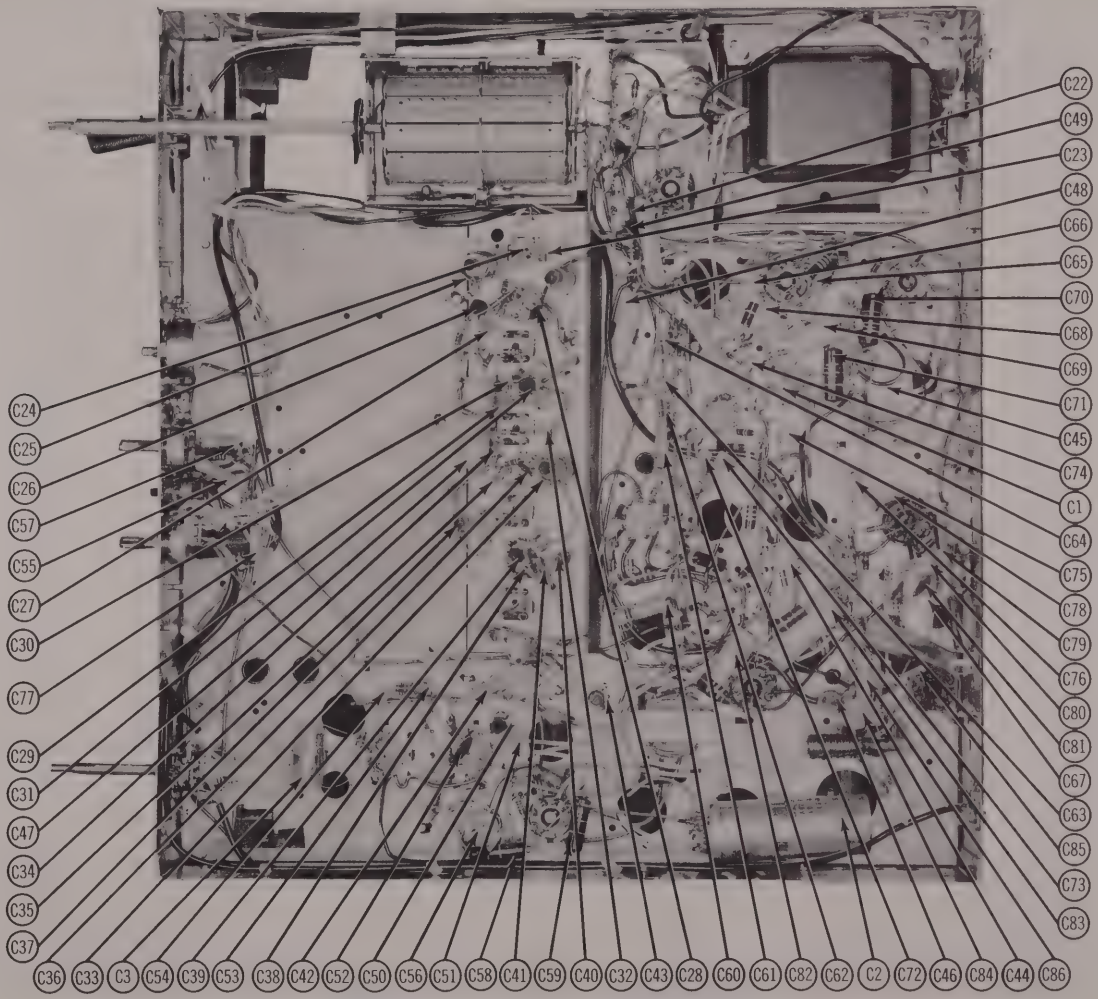
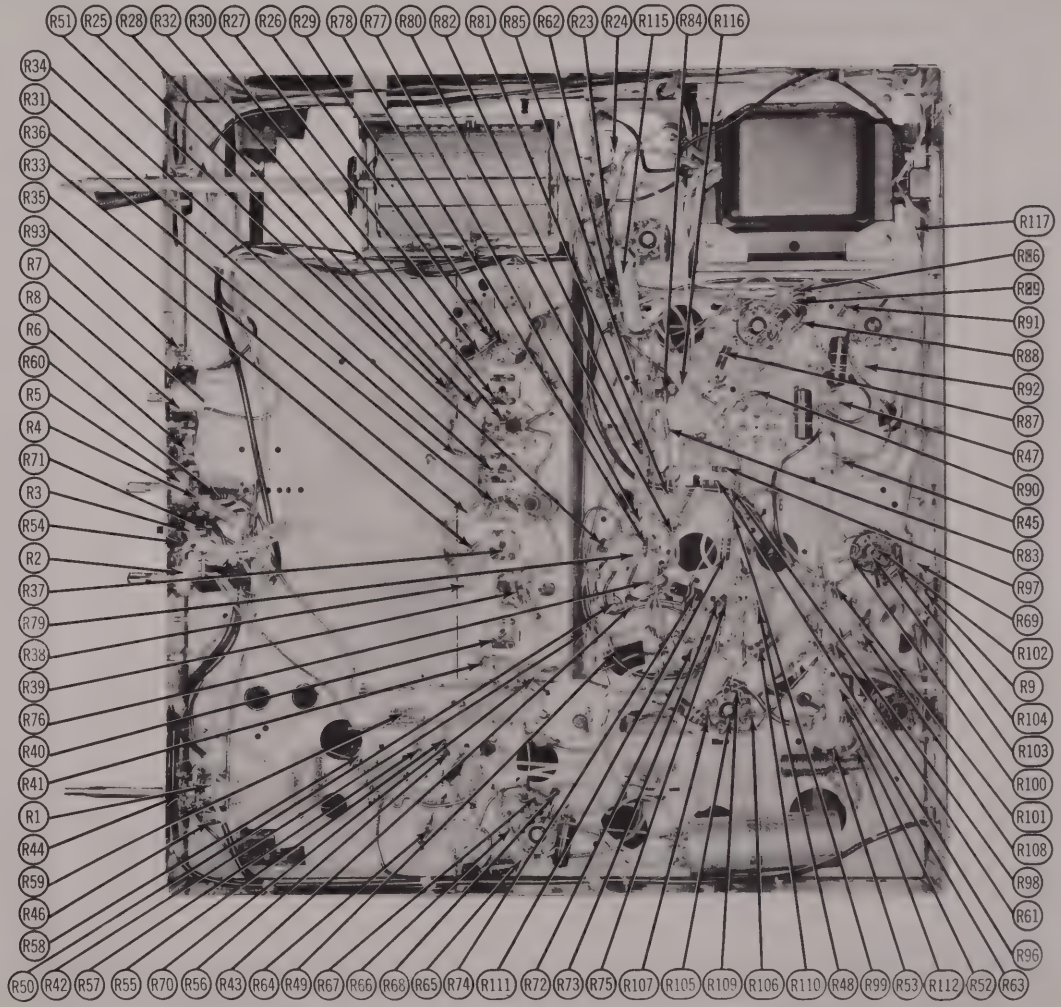


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

HOFFMAN MODELS 248197, U, U2, 248371, U, U2, 248735, U, U2, 24M370, U, U2, 248372, U, U2, 248735, U, U2, 240211-5, U, U2, 24W196, U, U2, 24W370, U, U2 (Cn. 413-24, 414-24)

SET 303 FOLDER 4



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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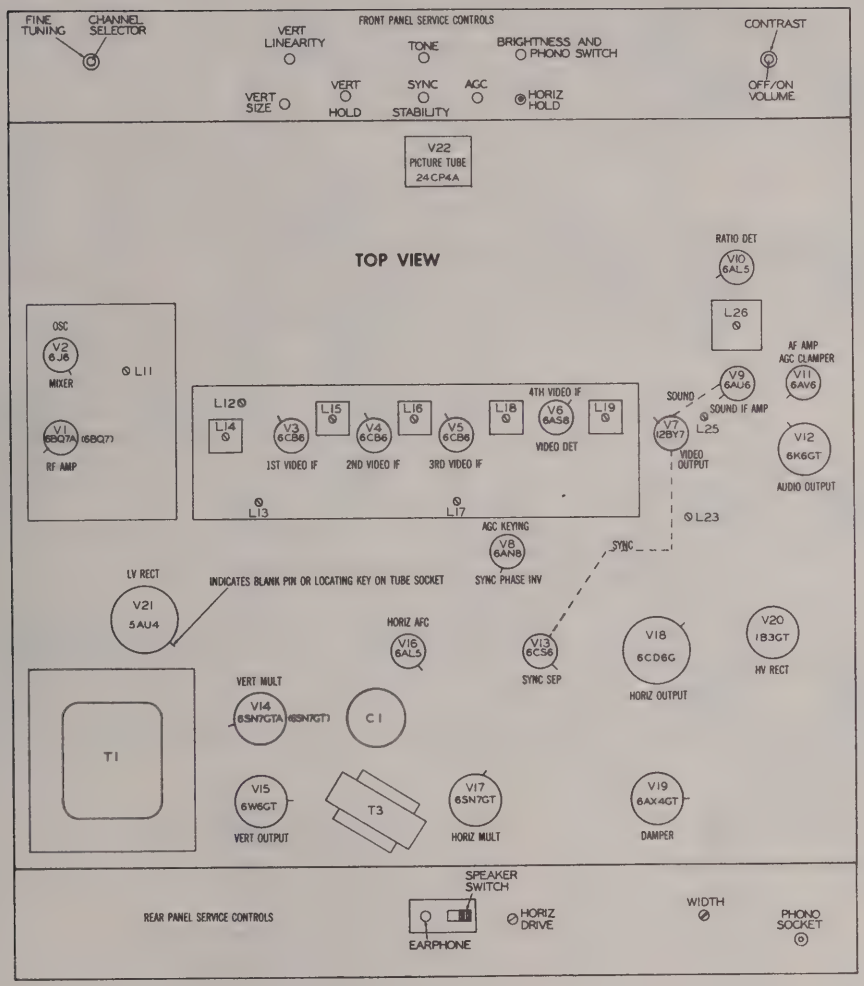
TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V21

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6, V7
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V7, V8, V22
Has pic, no sound - V9, V10, V11, V12
Overloaded picture - V8, V11

SYNC FAILURE
No vert. sync - V8, V14
No horiz. sync - V8, V16, V17
No vert. or horiz. sync - V8, V13

SWEEP FAILURE
No raster, has sound - V17, V18, V19, V20, V22
No vertical deflection - V14, V15
Poor vert. linearity or foldover - V14, V15
Poor horiz. linearity or foldover - V17, V18, V19
Narrow picture - V17, V18, V19, V20, V21
Vert. off freq. - V8, V14
Horiz. off freq. - V8, V16, V17

F. [illegible] SHIP
3002 MEADE ST.
DENVER, COLORADO.

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Do not remove (V17) to eliminate the high voltage shock hazard. Switch the tuner between channels so that the detent roller rests on one of the high points of the drum disc. This will disable the local oscillator and reduce the possibility of erroneous indications.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.005MFD	High side to point A. Low side to chassis.	4.5MC (Unmod)	Between any two channels	DC probe to point B. Common to chassis.	A1, A2	Attenuate signal level to obtain 5 volts on VTVM. Adjust for maximum deflection.
2.	"	"	"	"	DC probe to point C. Common to chassis.	A3	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.005MFD	High side to point A. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru 10K Ω to point B. Low side to chassis.	A1, A2	Disconnect stabilizing capacitor (C3). Adjust A1 and A2 for curve of maximum amplitude and symmetry similar to Fig. 1.
2	"	"	"	"	"	Vert. Amp. thru 10K Ω to point A. Low side to chassis.	A3	Reconnect C3. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 2. SLIGHTLY retouch A3 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

Turn contrast control fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
3.	.005MFD	High side to point A. Low side to chassis.	4.5MC (Unmod)	Between any two channels	DC probe to pin 11 (cathode) of picture tube thru detector (Fig. 3). Common to chassis.	A4	Adjust for MINIMUM deflection.

VIDEO IF ALIGNMENT

Turn the contrast control fully counter clockwise. Connect the negative lead of a 3 volt battery to the ungrounded side of C47. Connect the positive lead to chassis.
Attenuate generator as low as possible to obtain readings.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
4.	Direct	High side to an ungrounded tube shield floating over converter tube. Low side to chassis.	41.25MC (Unmod)	Set between any two channels	DC probe to point A. Common to chassis.	A5	Adjust for MINIMUM deflection.
5.	"	"	43.0MC	"	"	A8	Adjust for maximum deflection.
6.	"	"	44.75MC	"	"	A7	"
7.	"	"	43.25MC	"	"	A6	"
8.	"	"	45.2MC	"	"	A9	"
9.	"	"	43.5MC	"	"	A10	Adjust for MINIMUM deflection.
10.	"	"	43.6MC	"	"	A11	Adjust for maximum deflection.
11.	"	"	39.75MC	"	"	A13	Adjust for MINIMUM deflection.
12.	"	"	47.25MC	"	"	A13	"
13.	"	"	43.5MC	"	"	A11	Readjust for maximum deflection.
14.	"	"	43.25MC	"	"	A10	Readjust A10 for maximum deflection. Repeat steps 4 thru 14 until no further improvement is noted.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Connect bias as under "Video IF Alignment".

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
15	Direct	High side to an ungrounded tube shield floating over converter tube. Low side to chassis.	43.0MC (30MC Swp)	39.75MC 41.25MC 43.0MC 45.75MC 47.25MC	Set channel selector between any two channels	Vert. Amp. thru 10K Ω to point A. Low side to chassis.		Check for response curve similar to Fig. 4. Use high scope gain and sweep generator output to view trap markers. If necessary, retouch A6, A8 and A9 for desired response. Markpeas should be approximately 3.75MC. Adjust A9 to place 45.75MC at 50% on response curve. Adjust A8 to place 43.0MC marker. Adjust A6 to eliminate tilt.

FIG. 1

FIG. 2

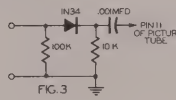


FIG. 3

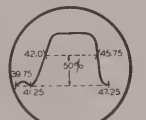


FIG. 4

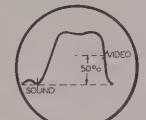


FIG. 5

FIG. 6

VHF OSCILLATOR ALIGNMENT

In UHF-VHF tuners 9838 and 9881 complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A30. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel. If adjustment of A30 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment screw for each channel that is off frequency.
Note: Adjustment A30 is not in VHF tuner 9839. The channel oscillator adjustment screws in VHF tuner 9839 are reached through a hole just to the right of the channel switch shaft. In UHF-VHF tuners 9838 and 9881 the channel oscillator adjustment screws are reached through a hole just to the left of the channel switch shaft (hole extends through UHF base).
The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (09MC Swp)	211.25MC 213.75MC	13	Vert. Amp. thru 10KΩ to point A. Low side to chassis.	A14	Adjust to place sound marker in trap notch as in Fig. 5. Video marker should be at 50%.
			207MC (09MC Swp)	205.25MC 209.75MC	12		A15	
			201MC (09MC Swp)	199.25MC 203.75MC	11		A16	
			195MC (09MC Swp)	193.25MC 197.75MC	10		A17	
			189MC (09MC Swp)	187.25MC 191.75MC	9		A18	
			183MC (09MC Swp)	181.25MC 185.75MC	8		A19	
			177MC (09MC Swp)	175.25MC 179.75MC	7		A20	
			85MC (09MC Swp)	83.25MC 87.75MC	6		A21	
			79MC (09MC Swp)	77.25MC 81.75MC	5		A22	
			69MC (09MC Swp)	67.25MC 71.75MC	4		A23	
			63MC (09MC Swp)	61.25MC 65.75MC	3		A24	
			57MC (09MC Swp)	55.25MC 59.75MC	2		A25	

VHF RF AND MIXER ALIGNMENT

Leave bias connected as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
17.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (09MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point A. Low side to chassis.	A36, A37, A38	Adjust for response curve similar to Fig. 6 with markers above 90%.
18.	"	"	213MC (09MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any one channel, make compromise adjustment of A36, A37 and A38 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			207MC (09MC Swp)	205.25MC 209.75MC	12			
			201MC (09MC Swp)	199.25MC 203.75MC	11			
			195MC (09MC Swp)	193.25MC 197.75MC	10			
			189MC (09MC Swp)	187.25MC 191.75MC	9			
			183MC (09MC Swp)	181.25MC 185.75MC	8			
			177MC (09MC Swp)	175.25MC 179.75MC	7			
			85MC (09MC Swp)	83.25MC 87.75MC	6			
			79MC (09MC Swp)	77.25MC 81.75MC	5			
			69MC (09MC Swp)	67.25MC 71.75MC	4			
			63MC (09MC Swp)	61.25MC 65.75MC	3			
			57MC (09MC Swp)	55.25MC 59.75MC	2			

45.5MC TRAP ADJUSTMENT

Adjust the 45.5 trap adjustment (A39) for MINIMUM interference on channel 3.

UHF OSCILLATOR ALIGNMENT FOR UHF-VHF TUNER 9838 (USED IN CHASSIS 414-24U)

Switch tuner to UHF position and remove tuner knobs. The UHF oscillator adjustment screws are reached thru the same hole used for VHF oscillator adjustment. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel strip. Leave bias connected as under "VHF Oscillator Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
19.	Two 120Ω Carbon Resistors	Across UHF antenna terminals with 120Ω in each lead.	473MC (09MC Swp)	471.25MC 475.75MC	14	Vert. Amp. thru 10KΩ to point A. Low side to chassis.	A31	Adjust to place sound marker in trap notch as in Fig. 8. Video marker should be at 50%.
			515MC (09MC Swp)	513.75MC 517.75MC	21		A32	
			575MC (09MC Swp)	573.25MC 577.75MC	31		A33	
			635MC (09MC Swp)	633.25MC 637.75MC	41		A34	
			695MC (09MC Swp)	693.25MC 697.75MC	51		A35	
			755MC (09MC Swp)	753.25MC 757.75MC	61		A36	
			815MC (09MC Swp)	813.25MC 817.75MC	71		A37	
			875MC (09MC Swp)	873.25MC 877.75MC	81		A38	

UHF OSCILLATOR ALIGNMENT FOR UHF-VHF TUNER 9881 (USED IN CHASSIS 414-34U2)

In the event the UHF oscillator tube is replaced, it is recommended that several tubes be tried and the one which works best should be used. Alignment of this portion of the tuner should not be required in the field.

UHF RF AND MIXER ALIGNMENT FOR UHF-VHF TUNERS 9838 AND 9881

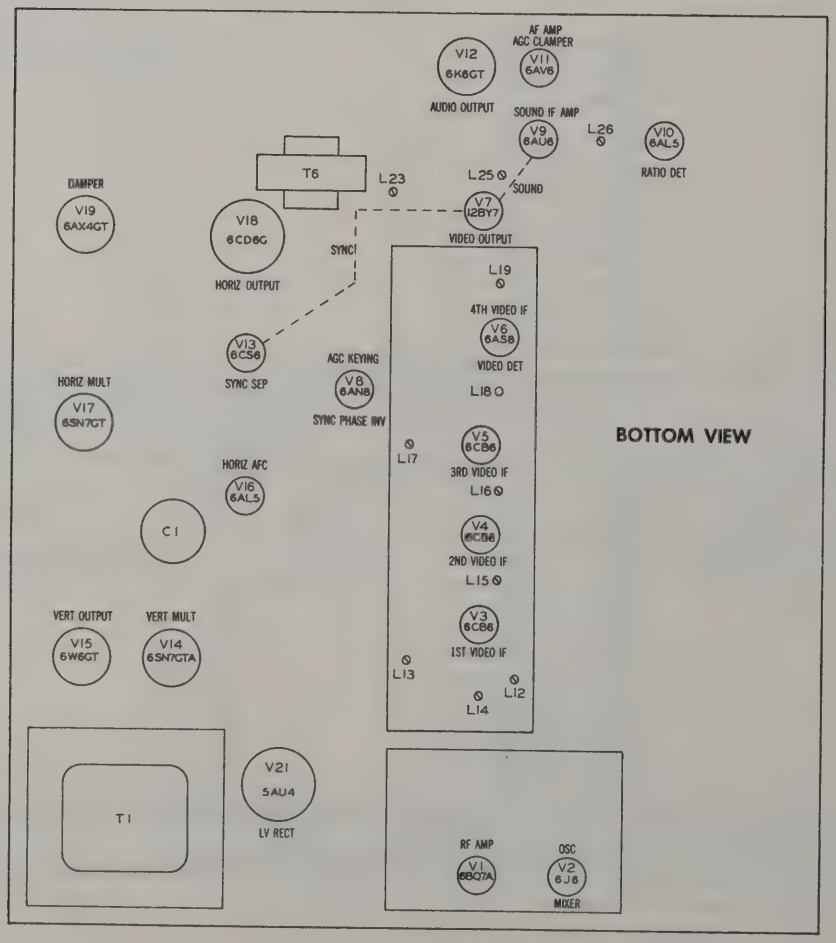
The RF and Mixer portion of these tuners have been properly aligned at the factory and are very stable. Alignment should not be required in the field.

HOFFMAN MODELS 24B197, U, U2, 24B371, U, U2, 24B7325, U, U2, 24B7370, U, U2, 24B7371-5, U, U2, 24W196, U, U2, 24W370, U, U2 (Ch. 413-24, 414-24)

RESISTANCE MEASUREMENTS

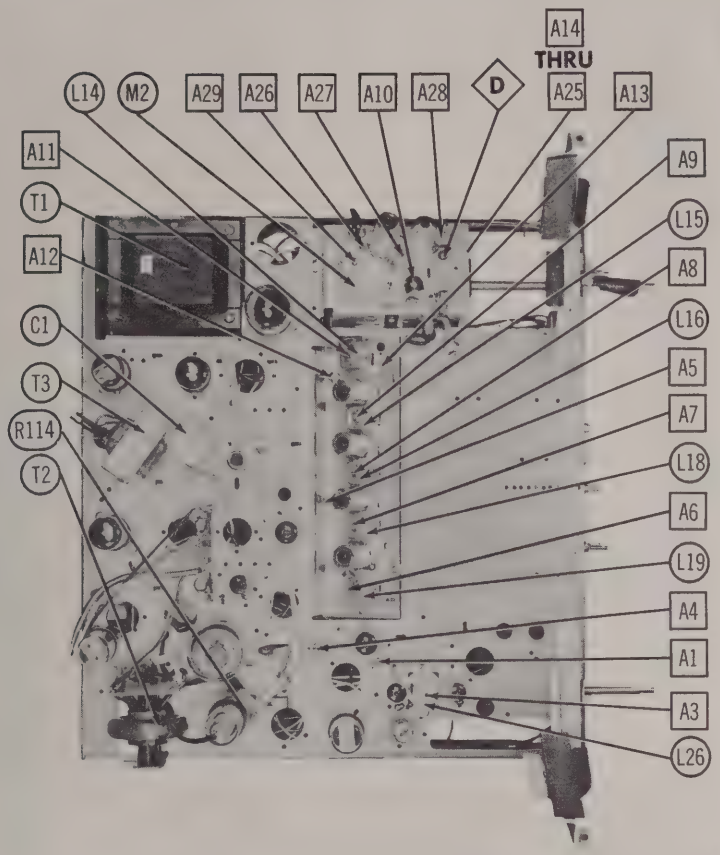
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	800KΩ	0Ω	.1Ω	0Ω	†1.6KΩ	250KΩ	INF	0Ω
V 2	6J6	†6.5KΩ	†17KΩ	.1Ω	0Ω	235KΩ	10KΩ	0Ω		
V 3	6CB6	60KΩ	47Ω	.1Ω	0Ω	†2.1KΩ	†2.1KΩ	0Ω		
V 4	6CB6	.1Ω	120Ω	.1Ω	0Ω	†2.1KΩ	†2.1KΩ	0Ω		
V 5	6CB6	60KΩ	47Ω	.1Ω	0Ω	†2.1KΩ	†2.1KΩ	0Ω		
V 6	6AS8	†2.1KΩ	.1Ω	180Ω	0Ω	.1Ω	4.7KΩ	0Ω	.1Ω	†2.1KΩ
V 7	12BY7	95Ω	4.7KΩ	0Ω	0Ω	0Ω	.1Ω	†6.5KΩ	†1.6KΩ	0Ω
V 8	6AN8	†6KΩ	†390KΩ	4KΩ	.1Ω	0Ω	450KΩ	†120Ω	†50KΩ	†1.6KΩ
V 9	6AU6	1Ω	0Ω	.1Ω	0Ω	†3.8KΩ	†3.8KΩ	150Ω		
V 10	6AL5	INF	INF	.1Ω	0Ω	20KΩ	0Ω	0Ω		
V 11	6AV6	10Meg	0Ω	0Ω	.1Ω	650KΩ	650KΩ	†220KΩ		
V 12	6K6GT	TP	0Ω	†1.5KΩ	†1.1KΩ	470KΩ	NC	.1Ω	560Ω	
V 13	6CS6	0Ω	0Ω	0Ω	.1Ω	†390KΩ	†15KΩ	1.5Meg		
V 14	6SN7GTA	4.7Meg	▲190KΩ	1KΩ	1.6Meg	▲700KΩ	1KΩ	.1Ω	0Ω	
V 15	6W6GT	TP	0Ω	†700Ω	†800Ω	1Meg	NC	.1Ω	1KΩ	
V 16	6AL5	68KΩ	68KΩ	0Ω	.1Ω	5Meg	NC	5Meg		
V 17	6SN7GT	4.7Meg	†9.5KΩ	1.5KΩ	120KΩ	†85KΩ	1.5KΩ	.1Ω	0Ω	
V 18	6CD6G	TP	0Ω	120Ω	TP	470KΩ	TP	.1Ω	†18KΩ	TOP CAP ▲9Ω
V 19	6AX4GT	NC	NC	INF	NC	†120Ω	NC	0Ω	.1Ω	
V 20	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲334Ω
V 21	5AU4	NC	15KΩ	TP	14Ω	NC	15Ω	NC	15KΩ	
V 22	24CP4A	0Ω	†35KΩ	PIN 10 ▲10KΩ	PIN 11 †220KΩ	PIN 12 .1Ω				

†MEASURED FROM PIN 2 OF V21.
▲MEASURED FROM PIN 3 OF V19.
TP-TIE POINT.
NC-NO CONNECTION.

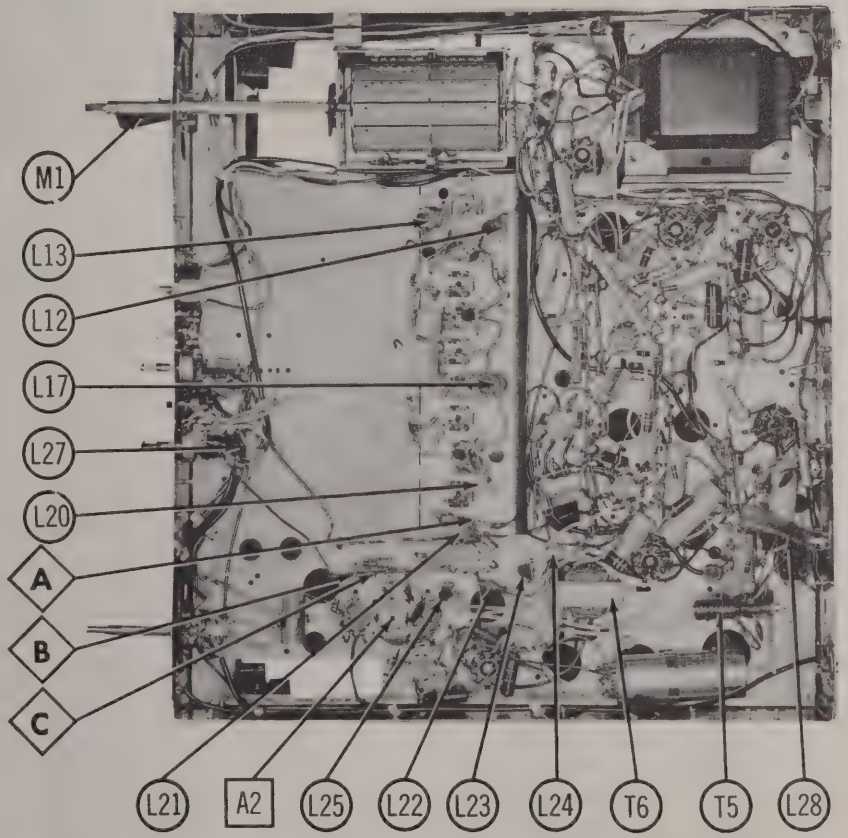


TUBE PLACEMENT CHART

L. F. BLANKENSHIP
3641 MEADE ST.
DENVER, COLORADO



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

SET 303 FOLDER 4

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: HOFFMAN PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BQ7A	6BQ7A	9AJ	6BQ7 used as an alternate
V2	Mixer - Osc.	6J8	6J8	7BT	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp	6CB6	6CB6	7CM	
V6	4th. Video IF Amp.				
	Video Detector	6AS9	6AS8	9DS	
V7	Video Output	12BY7	12BY7	9BF	
V8	AGC Keying-				
	Sync Phase Inv.	6AN8	6AN8	9DA	
V9	Sound IF Amp.	6AU8	6AU8	7BK	
V10	Ratio Detector	6AL5	6AL5	6FT	
V11	AF Amplifier-				
	AGC Clamper	6AV6	6AV6	7BT	
V12	Audio Output	6K8GT	6K8GT	7S	
V13	Sync Separator	6CS6	6CS6	7CH	
V14	Vert. Mult.	6BNTGTA	6BNTGTA	8BD	6BNTGT used as an alternate
V15	Vert. Output	5W8GT	5W8GT	7AC	
V16	Horiz AFC	6AL5	6AL5	6BT	
V17	Horiz. Mult.	6BNTGT	6BNTGT	8BD	
V18	Horiz. Output	6CD6G	6CD6G	8BT	
V19	Damper	6AX4GT	6AX4GT	8CG	
V20	HV Rectifier	1B3GT	1B3GT	8C	
V21	LV Rectifier	5AU4	5AU4	8T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: HOFFMAN PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V22	24CP4A 1	24TP4/24CP4 1	24TP4/24CP4 1	24CP4A 2 24CP4	24CP4A 1	12N 12N	1 Aluminized 2 Silver Screen

ELECTROLYTIC CAPACITORS

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: HOFFMAN PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1A	+100	350		FP389-1	TM-4046	Q-025	
B	±40	350		TC78	TDL-D30-450	MT-4540	
C	±10	350					
D	10	350			TM-4113	Q-025	
C2A	+100	350				FMD-301	
B	±20	350					
C	±50	50					
D	30	50					
C3	5	50		TC30	TD-5-50	MMT-0505	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP	VOLT	REPLACEMENT DATA: HOFFMAN PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C4	3-8			538-10			
C5	3-8			538-10			
C6	900						
C7	3			TCZ-3R3	MPGA-080	ZT-553	
C8	.5-3			538-3	3125-01-0R5	CT565A	
C9	300						
C10	120			DD-131	831-131	UC-5312	
C11	300						
C12	300						
C13	51			DD-500	831-510	UC-545	
C14	.5-3			538-3	3125-01-0R5	CT565A	
C15	10			TCZ-10	MPGA-100	ZT-541	
C16	5						
C17	1500			DD-152	801-0015	DC-5315	
C18	1500			DD-152	801-0015	DC-5315	
C19	6.8			TCZ-6R8	MPGA-6R8	ZT-5568	
C20	900						
C21	900						
C22	5000			DD-503	831-005	DC-535	
C23	33			TCZ-33	MPDL-330	ZT-5433	
C24	10			D6-100	GPDL-100	UC-541	
C25	56			DD-560	831-560	UC-5456	
C26	1000			DD-102	801-001	DC-521	
C27	470			DD-471	831-471	UC-5347	
C28	1000			DD-102	801-001	DC-521	
C29	470			DD-471	831-471	UC-5347	
C30	470			DD-471	831-471	UC-5347	
C31	1000			DD-102	801-001	DC-521	
C32	1.5			TCZ-1R5	MPGA-1R5	ZT-5315	
C33	100			TCZ-100	MPG-337-101	ZT-541	
C34	1000			DD-102	801-001	DC-521	
C35	470			DD-471	831-471	UC-5347	
C36	1000			DD-102	801-001	DC-521	
C37	1000			DD-102	801-001	DC-521	
C38	470			DD-471	831-471	UC-5347	
C39	1000			DD-102	801-001	DC-521	
C40	1000			DD-102	801-001	DC-521	
C41	10			D6-100	GPDL-100	UC-541	
C42	5000			DD-502	831-005	DC-535	
C43	47			TCZ-47	MPG-336-470	ZT-5447	
C44	.33	200				PT4023	
C45	.33	200				PT4023	
C46	5000			DD-502	831-005	DC-535	
C47	.47	200				PT4047	
C48	.22	400				PT4023	
C49	5000			DD-502	831-005	DC-535	
C50	2.2			TCZ-2R2	MPGA-2R2		
C51	68			D6-023	823-004	DCD-534	
C52A	4000			D6-402			
B	4000			D6-502	GPZ-333-502	PT635	
C53	.005	400		DD-503	831-005	DC-535	
C54	5000			D6-472	GPZ-333-472	PT5247	
C55	.0047	400		DD-502	831-005	DC-535	
C56	5000			D6-472	GPZ-333-472	PT5247	
C57	.0047	400		D6-103	GPZ-333-103	PT651	
C58	.01	600		D6-103	GPZ-333-103	PT651	
C59	.01	600					

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING: CAP.	VOLT.	REPLACEMENT DATA: HOFFMAN PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C60	.047	200		DF-503		PT4347	
C61	.0047	400		D6-472	GPZ-333-472	PT5247	
C62	.002	200		D6-202	GPZ-333-202	PT623	
C63	.005	200		D6-503	GPZ-333-502	PT635	
C64	.005	200		D6-503	GPZ-333-502	PT635	
C65	.0039	400				MCD463	
C66	.047	200		DF-503		PT4347	
C67	.22	600				PT6023	
C68	.1	600		DF-104		PT601	
C69	.1	600		DF-104		PT601	
C70	.022	600		DF-303	811-021	PT6123	
C71	.022	600		DF-303	811-021	PT6123	
C72	.001	600		D6-102	GPZL-102	PT621	
C73	.001	400		D6-102	GPZL-102	PT621	
C74	.0033	400					
C75	.0047	400				MCD465	
C76	.047	200		DF-503		PT4347	
C77	3900	500				MCD463	
C78	470	500		D6-471	811-471	MCD245	
C79	.001	400			811-102	MCD255	
C80	390	500		D6-391	811-391	MCD243	
C81	5000			DD-502	831-005	DC-535	
C82	.1	600		DF-104		PT601	
C83	.47	200				PT4047	
C84	470	3000		DD30-471	3KV-471	DC30447	
C85	47	3000		DD30-470	3KV-470	DC30447	
C86	.1	600		DF-104		PT601	
C87	360	5000					

CONTROLS

ITEM No.	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: HOFFMAN PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500Ω	½	4993	F1-1	RTV-532	QJ-829†	UF52L	Contrast (Panel) See Note 1
B	500KΩ	* ½		R3-48			UR55-T154	Volume (Rear) Tap at 180KΩ
C	Switch			KS-3			US-27	Attach to R1B
R1A	500Ω	½	4992					Contrast-See Note 2
B	2Meg	½						Volume & Switch
R2	50KΩ	½	4987					Brightness & Phase Switch
R3A	50KΩ	½	4964	BX-31	A47-50K-S	Q11-123	TA54L	A. G. C.
B	Shaft		Not Req.	Not Req.	Not Req.	Not Req.	Not Req.	Attach to R3A.
R4A	1Meg	½	4801A-1	BX-59	A47-1Meg-S	Q11-137	TA16L	Sync Stability
B	Shaft		Not Req.	Not Req.	FK3-1/4	Not Req.	Not Req.	Attach to R4A.
R5A	1Meg	½	4990	AB-59	A47-1Meg-S	Q11-137	TA16L	Tone-See Note 1
B	Shaft		Not Req.	AE-4	KS8-3	Not Req.	Not Req.	Attach to R5A.
R6A	1 Meg	½	4801A-1	BX-59	A47-1Meg-S	Q11-137	TA16L	Vertical Hold
B	Shaft		Not Req.	Not Req.	FK3-1/4	Not Req.	Not Req.	Attach to R6A.
R7A	2Meg	½	4965-2	BX-75	A47-2Meg-S	Q11-139	TA26L	Vertical Size
B	Shaft		Not Req.	Not Req.	FK3-1/4	Not Req.	Not Req.	Attach to R7A.
R8A	2000Ω	2	4537A	VK-131	A43-2000	WK-2000	R2500L	Vertical Linearity
B	Shaft		Not Req.	Not Req.	FK3-1/4	Not Req.	Not Req.	Attach to R8A.
R8A	2000Ω	2	4924		A43-2000	WK-2000	R2500L	Vertical Linearity-See Note 3
B	Shaft		Not Req.		FK3-1/4	Not Req.	Not Req.	Attach to R8A.
R9A	50KΩ	½	4904	BX-31	A47-50K-S	Q11-123	TA54L	Horizontal Drive
B	Shaft		Not Req.	Not Req.	FK3-1/4	Not Req.	Not Req.	Attach to R9A.
R10A	2 Meg	½	4978	B-75	A47-2Meg-S	Q11-129	U-56	Trmic-See Note 2
B	Shaft		Not Req.	Not Req.	F3-3	Not Req.	Not Req.	Attach to R10A.
R11A	2Meg	½	4978	B-75	A47-2Meg-S	Q11-139	U-56	Bass-See Note 2
B	Shaft		Not Req.	Not Req.	F3-3	Not Req.	Not Req.	Attach to R11A.

Note 1. Used in chassis 413-24.
Note 2. Used in chassis 414-24.
Note 3. Used as an alternate in some versions.
* Universal Replacement (Mallory Exact Duplicate Part No. UE37S)
†CONCENTRIKIT EQUIVALENT; K-4 KIT, BASE EEEMENTS AND SHAFTS; B11-103, P1-204 (Panel)
B13-133X, R1-223 (Rear)
T6-2 (Switch)

RESISTORS

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: HOFFMAN PART No.	IRC PART No.	NOTES
R12	47KΩ	½		BTS-47K	
R13	15KΩ	½			
R14	100KΩ	½		BTS-100K	
R15	270KΩ	½		BTS-270K	
R16	180KΩ	½		BTS-180K	
R17	470Ω	½		BTS-470	
R18	10KΩ	½			
R19	4700Ω	½		BTS-4700	
R20	15KΩ	½			
R21	2200KΩ	½			
R22	15KΩ	½			
R23	1000Ω	½		BTS-1000	
R24	150Ω	½		BTS-150	
R25	470Ω	½		BTS-470	
R26	47KΩ	½			
R27	2200Ω	½		BTS-2200	
R28	470Ω	½		BTS-470	
R29	470Ω	½		BTS-47	
R30	15KΩ	½			
R31	470Ω	½		BTS-470	
R32	120Ω	½		BTS-120	
R33	470Ω	½		BTS-470	
R34	22KΩ	½			
R35	470Ω	½		BTS-470	
R36	47Ω	½			
R37	12KΩ	½		BTS-470	
R38	470Ω	½		BTS-470	
R39	1800Ω	½		BTS-1800	
R40	15KΩ	½		BTS-18K	
R41	4700Ω	½		BTS-4700	
R42	1500Ω	½		BTS-1500	
R43	3300Ω	1		BTA-3300	
R44	33Ω	½		BTS-33	
R45	22KΩ	½		BTS-22K	
R46	15KΩ	½		BTS-15K	Note 1
R47	4700Ω	½		BTS-4700	
R48	220KΩ	½		BTS-220K	
R49	15KΩ	½		BTS-15K	
R50	47KΩ	½		BTS-47K	

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: HOFFMAN PART No.	IRC PART No.	NOTES
R51	1.5Meg 5%	½		BTS-1.5Meg 5%	
R52	470KΩ	½		BTS-470K	
R53	3300Ω 5%	½		BTS-3300 5%	
R54	15KΩ	½		BTS-15K	
R55	2200Ω	½		BTS-2200	
R56	150Ω	½		BTS-150	
R57	18KΩ	½		BTS-18K	
R58	10KΩ	½		BTS-10K	
R59	10KΩ	½		BTS-10K	
R60	33KΩ	½		BTS-33K	
R61	2.2Meg 5%	½		BTS-2.2Meg 5%	
R62	120KΩ	½		BTS-120K	
R63	470KΩ	½		BTS-470K	
R64	10Meg	½		BTS-10Meg	
R65	220KΩ	½		BTS-220K	
R66	470KΩ	½		BTS-470K	
R67	1000Ω	2		BTS-1000	
R68	560Ω	1		BTA-560	
R69	3.3Ω	2			
R70	33KΩ	½		BTS-33K	
R71	100KΩ	½		BTS-100K	
R72	22KΩ	½		BTS-22K	
R73	1.5Meg	½		BTS-1.5Meg	
R74	15KΩ	½		BTS-15K	
R75	680Ω	½		BTS-680Ω	
R76	390KΩ	½		BTS-390K	
R77	2200Ω 5%	½		BTS-2200 5%	
R78	220Ω	½		BTS-220Ω	
R79	1800Ω	½		BTS-1800	
R80	180Ω 5%	½		BTS-1800 5%	
R81	330Ω	½		BTS-330	
R82	22KΩ	½		BTS-22K	
R83	8200Ω 5%	½		BTS-8200 5%	
R84	8200Ω 5%	½		BTS-8200 5%	
R85	4.7Meg	½		BTS-4.7Meg	
R86	180KΩ	½		BTS-180K	
R87	1000Ω	½		BTA-1000	
R88	1.5Meg	½		BTS-1.5Meg	
R89	680KΩ	½		BTA-680K	

RESISTORS (cont)

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: HOFFMAN PART No.	NOTES
R90	5600Ω	½	BTS-5600	
R91	100Ω	½	BTS-100	
R92	120Ω	½	BTS-120	
R93	470Ω	½	BTS-470	
R94	560Ω	½		
R95	560Ω	½		
R96	100KΩ	½		
R97	100KΩ	½		
R98	470KΩ	½	BTS-470K	
R99	4.7Meg	½		
R100	82000Ω	½		
R101	1000Ω	½		
R102	120KΩ	½		
R103	82KΩ	½		

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: HOFFMAN PART No.	IRC PART No.	NOTES
R104	1500Ω	½			
R105	4.7Meg	½			
R106	100Ω	½		BTS-100	
R107	18KΩ	2			
R108	470KΩ	½			
R109	82000Ω	½			
R110	120Ω	2			
R111	68KΩ	½			
R112	10KΩ	1			
R113	470Ω	½			
R114	2.7Ω	1		BW-2.7	
R115	120Ω	15			
R116	150KΩ	30		2D-1500	
R117	330KΩ	1		BTS-330K	

Note 1. Not used in some versions.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI	SEC. 1	SEC. 2	REPLACEMENT DATA: HOFFMAN PART No.	Hallicrafters PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No
T1	117VAC	570VCT	5VAC	5064	P-9728①	P-8055①		P-8167①		
	②2.08A	.300ADC	③3A							
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC									
	④1.6A									

① Parallel and phase 6.3V winding for Sec 3.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: HOFFMAN PART No.	Hallicrafters PART No.	Merit PART No.	RCA PART No.	Ram PART No	Stancor PART No.	Thordarson PART No.	Triad PART No
T2	Horiz. Output Trans.	5LRA	FB418 & BF600 *	HVO-38 *	230T1 & 214R1 *	X094 *	A-8253 *	FLY-18 & WC-30 *	D-50 & WC-11 *
T3	Vert. Output Trans.	5188-6	Z1900⑦	A-3223⑦	236T2⑦		A-8143⑦	26S72⑦	A-10EX⑦
T4A	Yoke(90°) Horiz.(LOMD)	DF606②	DF606②	MDF-81②	237D1④	Y90F1F④	23-13A②	Y-14④	Y-60-1④
B	Vert.(60MD)							③	
T5	Width Coil(8-18MH)	5464	RF600⑤⑥	MWC-11	212R1	20R18	WC-5⑤⑥	WC-18⑤	WC-12⑤ ⑥

① Drill new mounting hole(s).
② Use original horizontal damping network, if necessary.
③ Use original yoke clamping network.
④ Enlarge mounting hole(s).
⑤ Connect to terminals #1 and #2.
⑥ Connect to colored red and blue terminals.
⑦ Use 8 to 1 turns ratio.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type is Listed

	ORIGINAL TERMINAL CONNECTIONS	Hallicrafters Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	9	9	9	9	9	8	9	9
	7	7	7	7	7	1	7	7
	5	5	5	5	5	3	5	5
	3	3	3	3	3	2	3	3
	1	1	1	1	1	4	1	1
	6	RF600 Term. #3	6	214R1 Term."C"	6	7	WC-20 Term. #1	WC-11 Orange Term.
	2	RF600 Term. #4	2	214R1 Term."D"	2	8	WC-20 Term. #2	WC-11 Black Term.
Connect Width Coil Leads	1 & 3	RF600 Term. #1 & #2 across 1 & 3	1 & 3	214R1 Term."A" & "B" across 1 & 3	1 & 3	3 & 4	WC-20 Term. #3 & #4 across 1 & 3	WC-11 Red & blue terms. across 1 & 3
Special Notes		⑥		⑥			⑥	⑥

⑥ If picture is out of phase, reverse width coil primary or secondary.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI	SEC	REPLACEMENT DATA: HOFFMAN PART No.	Hallicrafters PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T6	6.2KΩ	3.4Ω	5186 5142A ①	21003	A-3020	A-3823	26S46	S-53X	① Output Transformer used in Ch. 414-24

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V. C. IMP	REPLACEMENT DATA: HOFFMAN PART No.	QUAM PART No.	NOTES
SP1	10"	PM	3.4Ω	H9102	10A3!	

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI	SEC	REPLACEMENT DATA: HOFFMAN PART No.	MEISSNER PART No	MERIT PART No	MILLER PART No	NOTES
L1	IF Trap	0Ω						Wound on 68MMF Cap.
L2	IF Trap	0Ω						Wound on 68MMF Cap.
L3	Ant. Coils	0Ω	CT 0Ω					
L4	IF Trap	1Ω						
L5	Fil. Choke	0Ω						
L6	Neut.Coil	0Ω						
L7	RF, Mixer Grid & Osc. Coils	0Ω						
L8	Fil. Choke	0Ω						
L9	Feedback Coil	0Ω						

PARTS LIST AND DESCRIPTIONS (Continued)

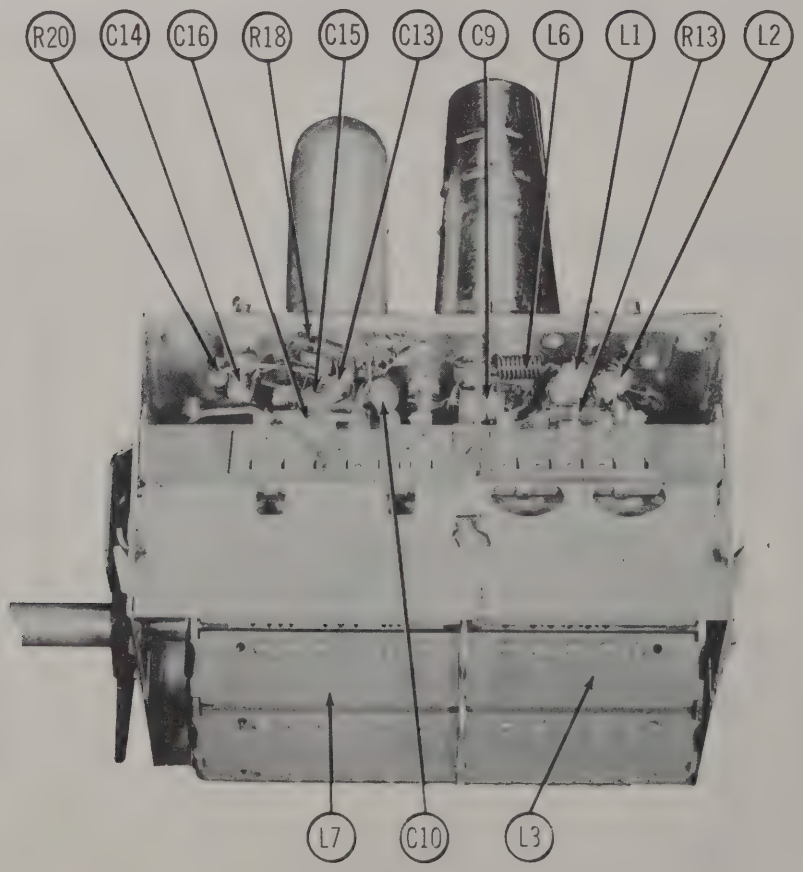
COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	HOFFMAN PART. No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L10	RF Coil	0Ω						
L11	Conv. Plate	0Ω						
L12	39.75MC Trap	0Ω		5241A-5			6225	
L13	47.25MC Trap	0Ω		H5284A-1				Tapped
L14	1st. Video IF	.3ΩCT		5285A				
L15	2nd. Video IF	.1Ω	.1Ω	5538-8	17-5003 *	TV-128 *	6233 *	
L16	3rd. Video IF	.1Ω	.1Ω	5538-8	17-5002 *	TV-127 *	6232 *	
L17	41.25MC Trap	0Ω		6438-4			6226	
L18	4th. Video IF	.1Ω	.1Ω	5538-8	17-5004	TV-125	6234	
L19	5th. Video IF	.1Ω	.1Ω	5242A-6	17-5004	TV-125	6234	
L20	Series Peaking Coil	4.8Ω			19-7068 ■		6110■	56 Microhenries, wound on 10Meg resistor
L21	Shunt Peaking Coil	23Ω					6156 ■	820 Microhenries, wound on 10Meg resistor
L22	Series Peaking Coil	3.8Ω			19-3036 ■	TV-180 ■	6176 ■	39 Microhenries, wound on 10Meg resistor
L23	4.5MC Trap	3.2			20-1004	TV-151	1469	
L24	Shunt Peaking Coil	16Ω			19-3500 ■	TV-188	6138 ■	470 Microhenries, wound on 10Meg resistor
L25	Sound IF	1Ω			20-1004	TV-151	1469	
L26	Ratio Det.	15Ω	1.5ΩCT	5252A-1	17-3497	TV-115	6205	Tertiary winding .5Ω
L27	Horiz. Osc.	65Ω		5236A-1	19-1576	TV-163	6210	
L28	RF Choke	0Ω			19-1002		4606	2.3 Microhenries

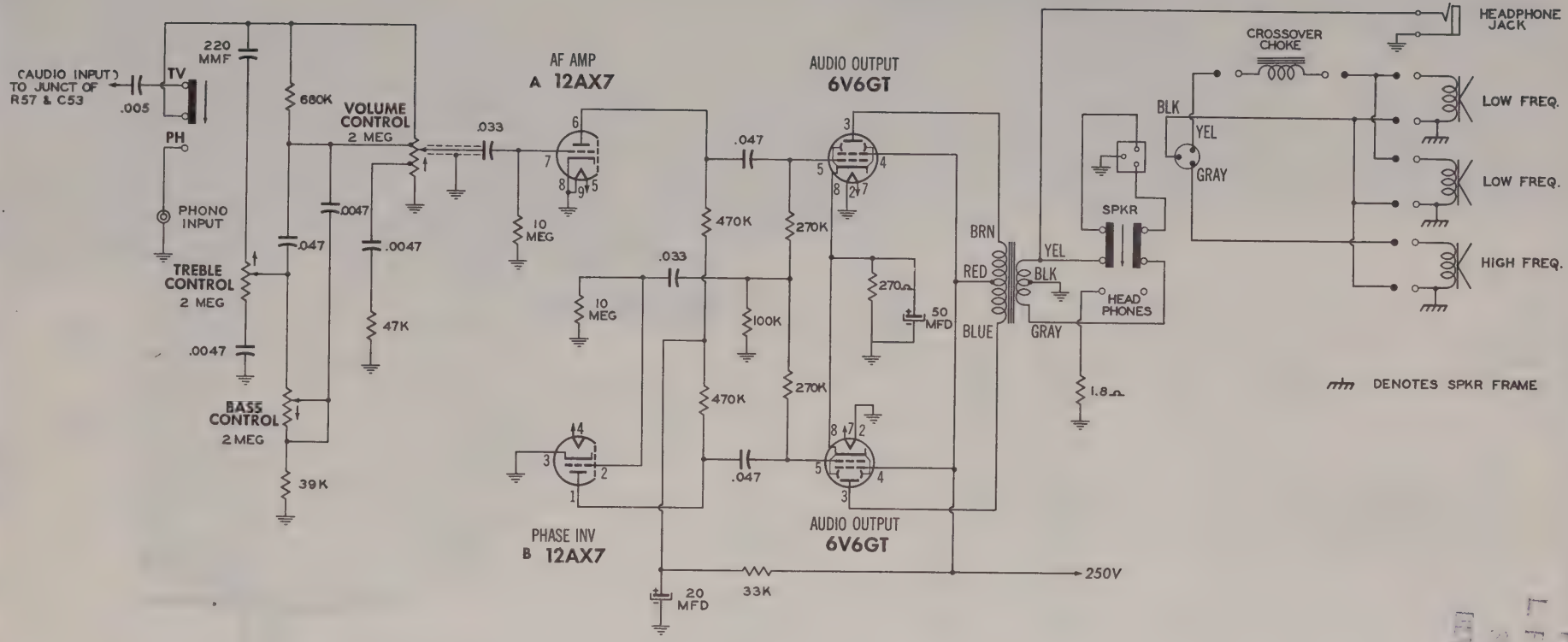
* Detune trap.
■ Parallel with 10Meg resistor.

MISCELLANEOUS

ITEM No.	PART NAME	HOFFMAN PART No.	NOTES
M1	Dial Light		#44
M2	Tuner	9839	VHF - Chassis 413-24, 414-24
M3	Tuner	9838	VHF-UHF - Chassis 413-24U, 414-24U
	Tuner	9861	VHF-UHF - Chassis 413-24U2, 414-24U2
M4	Switch		Speaker - Head phone (DPDT-Slide type)
M5	Focus Magnet	9789	Includes centering device
M6	Ion Trap		



RF TUNER RIGHT SIDE



AUDIO AMPLIFIER USED ON CHASSIS 414-24

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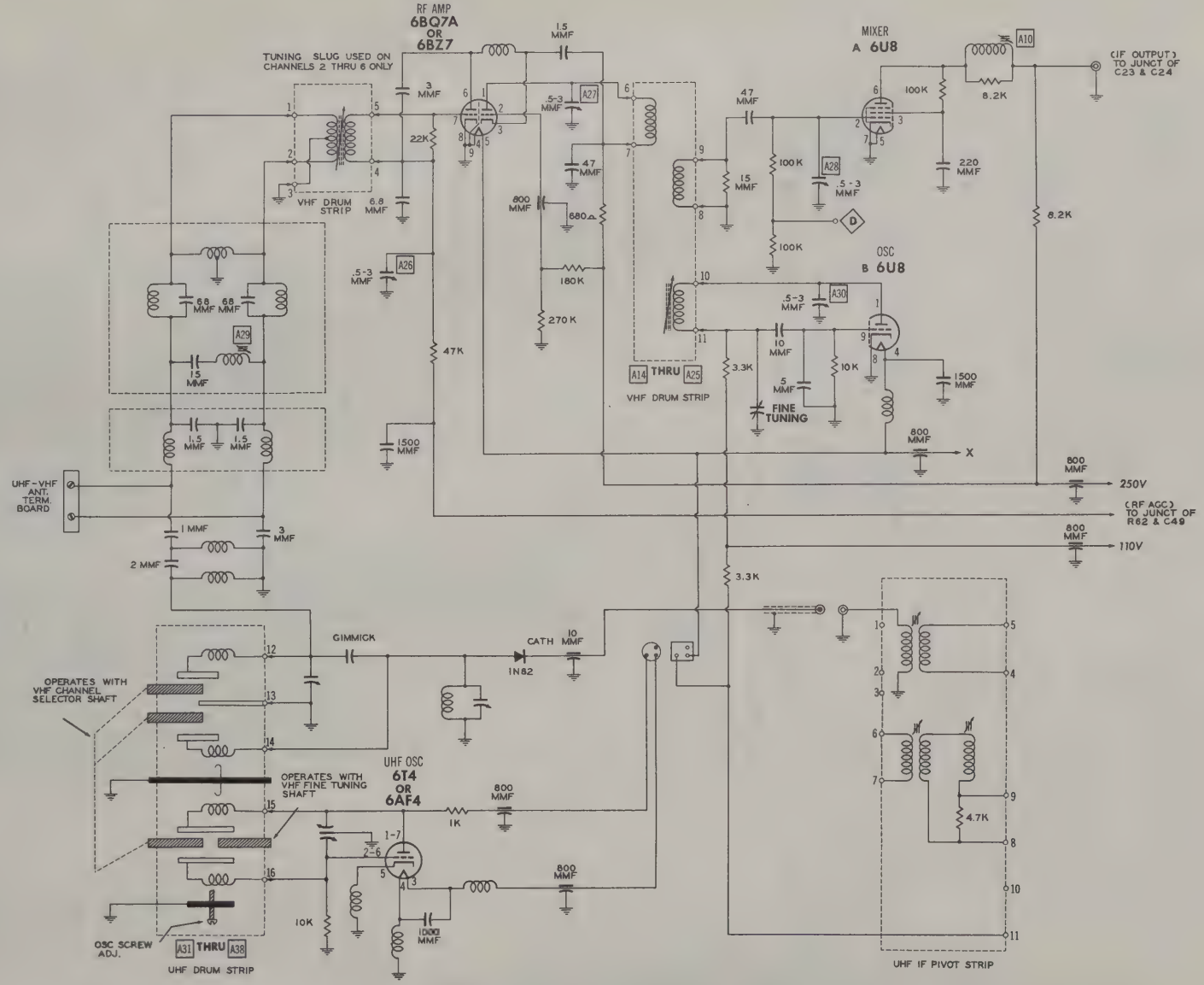
ALTERNATE AUDIO AMPLIFIER CIRCUIT



UHF-VHF TUNER PART NO. 9838 USED WITH CHASSIS 413-24U, AND 414-24U

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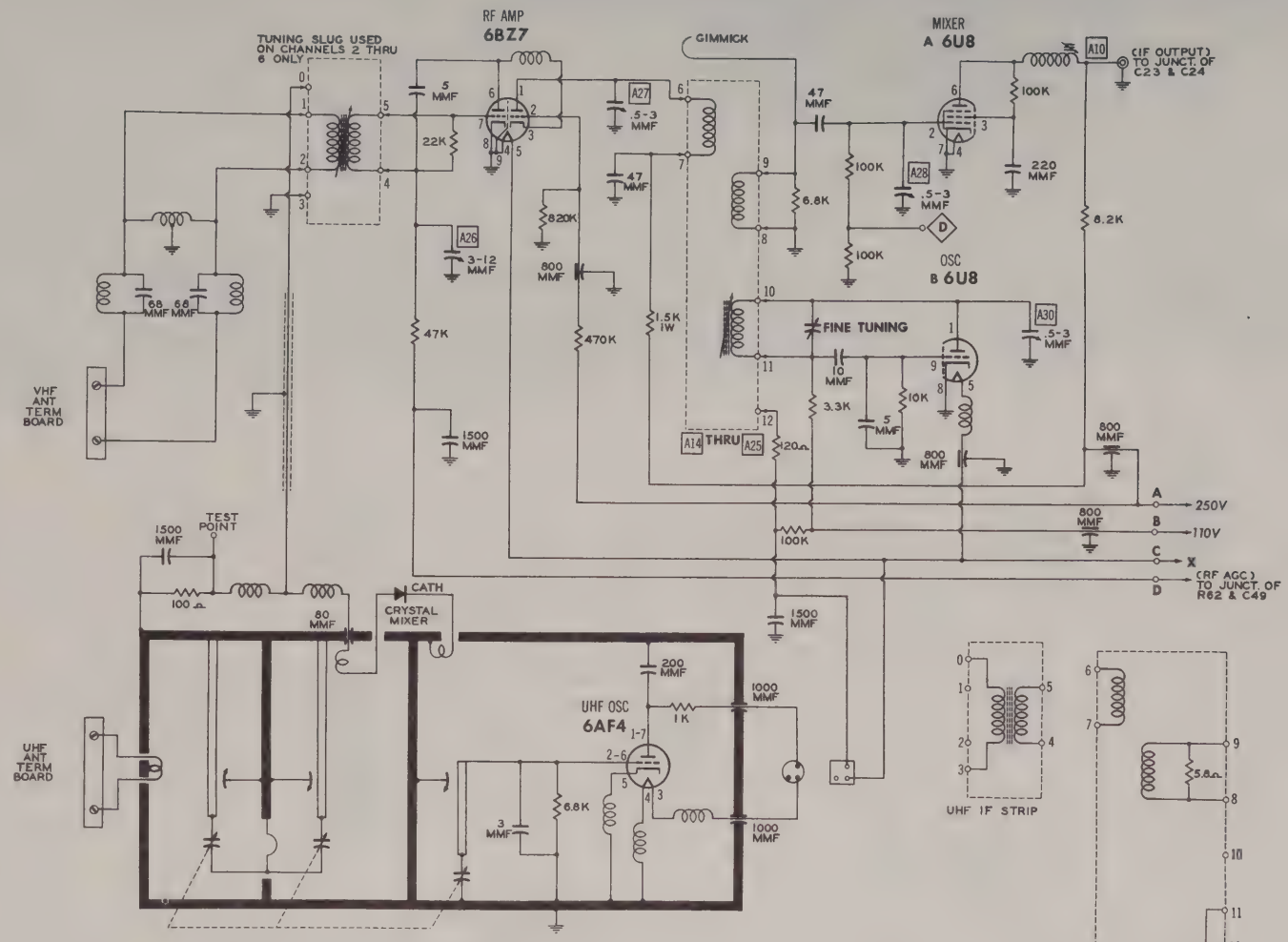
UHF-VHF TUNER SCHEMATIC



UHF-VHF TUNER PART NO. 9861 USED WITH CHASSIS 413-24U2 AND 414-24U2

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UHF-VHF TUNER SCHEMATIC

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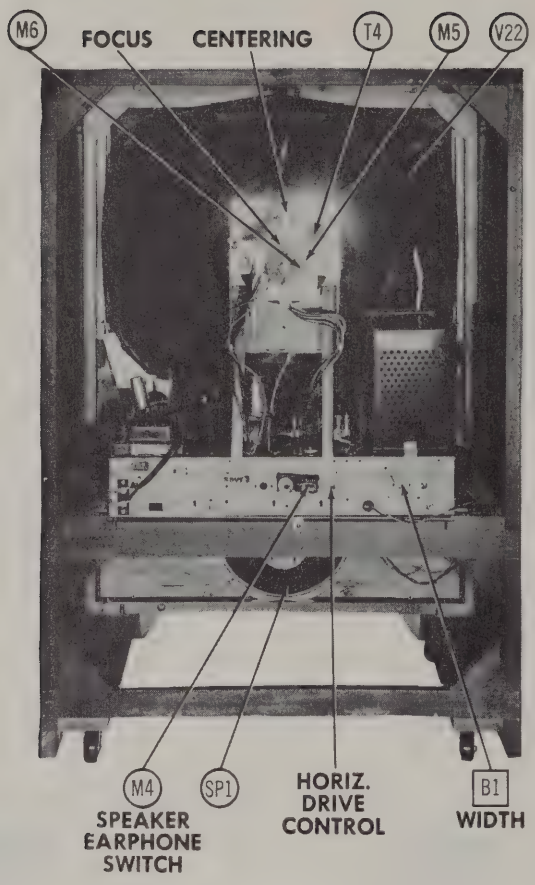


CABINET—REAR VIEW

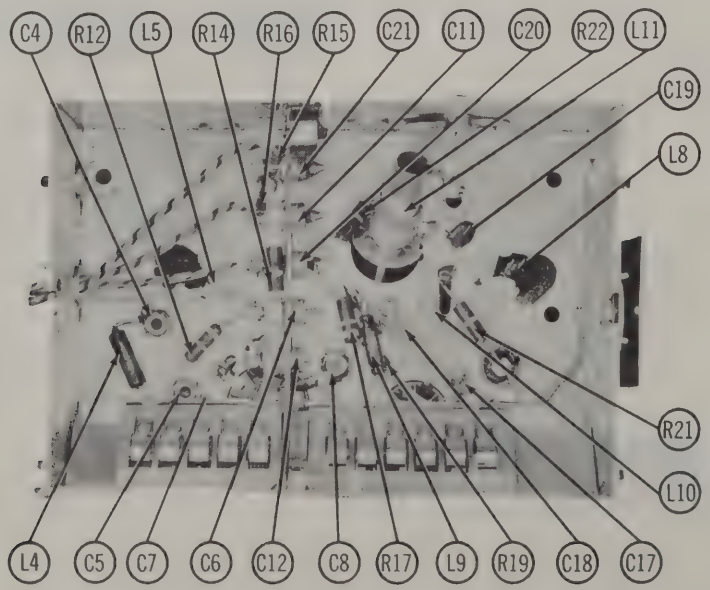
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Turn the horizontal drive control (R9) as far clockwise as possible without the presence of a vertical white line or compression near the center of the picture.

Adjust the horizontal hold control until the picture synchronizes horizontally. Switch off channel and back again, if the picture loses sync, slightly retouch the horizontal hold control.

Adjust the horizontal width slug (B1) for a picture slightly wider than necessary to fill the picture mask horizontally.



RF TUNER BOTTOM VIEW

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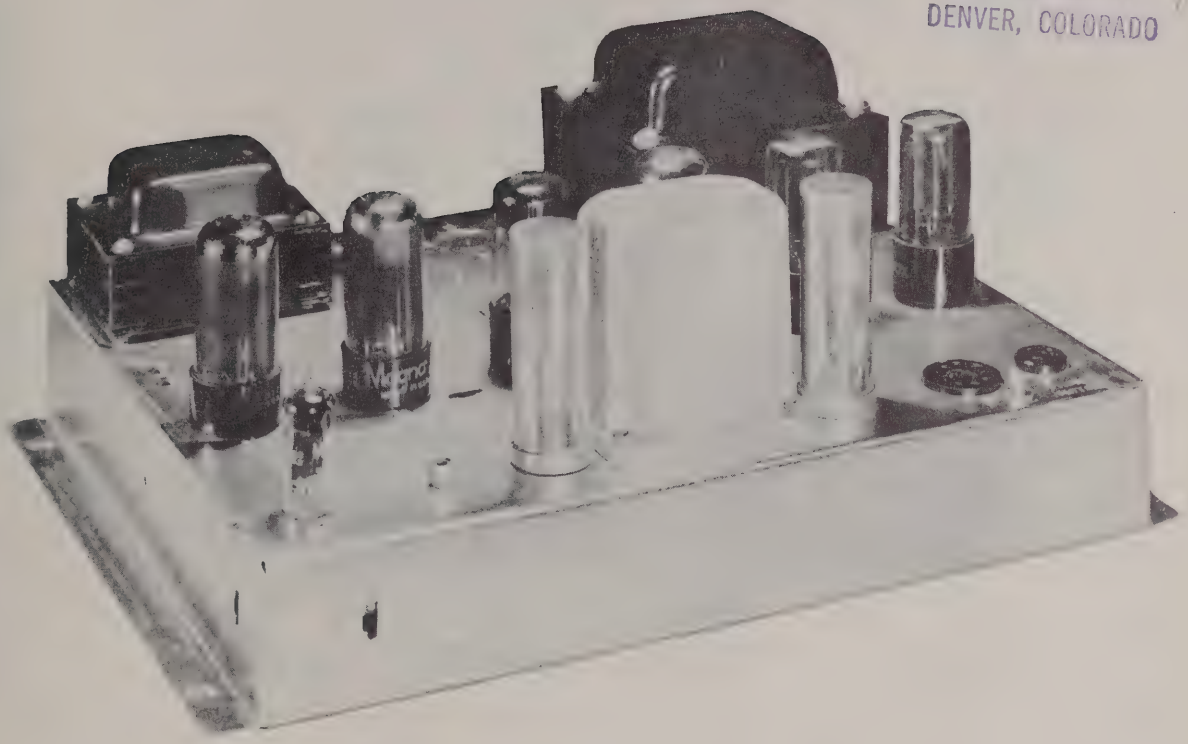
DENVER, COLORADO

MAGNAVOX
CHASSIS AMP-144



MAGNAVOX
CHASSIS AMP-144

TRADE NAME	Magnavox Chassis Amp. -144
MANUFACTURER	Magnavox Co., 2131 Bueter Rd., Fort Wayne, Ind.
TYPE SET	AC Operated 20 Watt Audio Amplifier
TUBES (Seven)	Types: 6C4 AF Amp., (4) 6V6GT Output, (2) 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-50/60 Cycles
RATING	1.26 Amp. @ 117 Volts AC

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PARTS LIST AND DESCRIPTIONS

MAGNAVOX
CHASSIS AMP-144

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		MAGNAVOX PART No.	STANDARD REPLACEMENT		
V1	AF Amp.	6C4	6C4	6BG	
V2	Audio Output	6V6GT	6V6GT	7AC	
V3	Audio Output	6V6GT	6V6GT	7AC	
V4	Audio Output	6V6GT	6V6GT	7AC	
V5	Audio Output	6V6GT	6V6GT	7AC	
V6	Rect.	5Y3GT	5Y3GT	5T	
V7	Rect.	5Y3GT	5Y3GT	5T	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	MAGNAVOX PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■30	475	270023-2	FP259		S-295	
B	▲10	475				FM-4710	
C2A	■30	475	270023-2	FP259		S-295	
B	▲10	475				FM-4710	
C3	20	25	270027-2	TC26	TD-25-25	FM-0225	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	MAGNAVOX PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C4	.1	600	250201-13	DF-104		PT601	
C5	15	500	250187-43	TCZ-15	NPOK-150		
C6	.022	600	260201-9	DF-203	817-02	PT6122	
C7	.001	600	250201-1	D6-102	GP2L-102	PT621	
C8	15	500	250187-43	TCZ-15	NPOK-150		
C9	.022	600	250201-9	DF-203	817-02	PT6122	
C10	.047	600	250201-11	DF-503		PT6147	
C11	.033	600	250201-10	DF-303		PT6133	
C12	10000	1000	250219-2	DD16-103		PT1611	
C13	.01	600		D6-103	GP3-333-103	PT611	
C14	.01	600		D6-103	GP3-333-103	PT611	

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MAGNAVOX PART No.	IRC PART No.	
R1	220KΩ	1/2	230104-90	BTS-220K	
R2	47KΩ	1/2	230104-46	BTS-47K	
R3	3300Ω	1/2	230104-68	BTS-3300	
R4	10KΩ	1	230105-74	BW-110K	
R5	100KΩ	1/2	230104-86	BTS-100K	
R6	4700Ω	1/2	230104-70	BTS-4700	
R7	10K Ω	1/2	230104-74	BTS-10K	
R8	100K Ω	1/2	230104-86	BTS-100K	

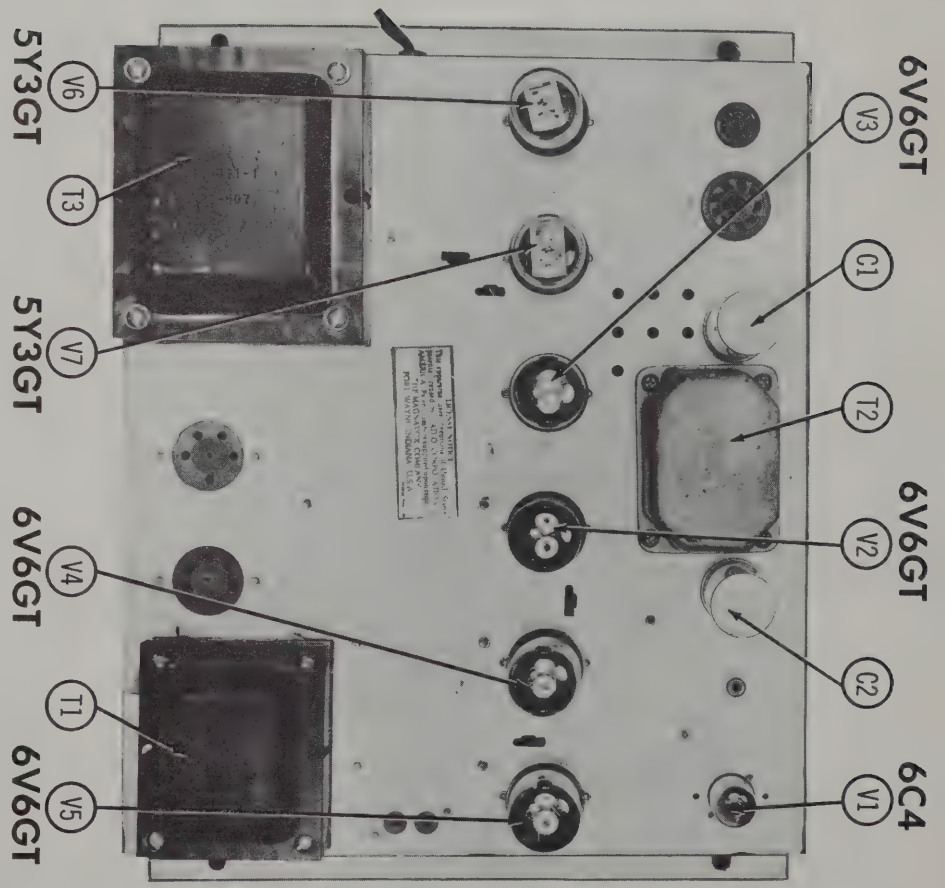
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MAGNAVOX PART No.	IRC PART No.	
R9	100Ω	1/2	230104-50	BTS-100	
R10	10KΩ	1/2	230104-74	BTS-10K	
R11	100K Ω	1/2	230104-86	BTS-100K	
R12	100Ω	1/2	230104-50	BTS-100	
R13	125Ω	10	240021-11	1 3/4A-125	
R14	12Ω	1	230105-39	BTA-12	
R15	100Ω	1/2	230104-50	BTS-100	
R16	100Ω	1/2	230104-50	BTS-100	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ 1.26A	574VCT .190ADC	5VAC @ 4A	6.3VAC @ 4.64A	300071-1		P-3077	P-8332 ① ②		

① Drill new mounting holes.
② Tape 6.3V @ 1.2A and .9A windings.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (INPUT)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	2.15KΩ RES	2.9KΩ RES	3.2KΩ RES		320021-G2					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T3	3.7KΩ CT	4.3Ω Tap@ 2.8Ω	330024-1						
T4	42.6Ω RES	.38Ω RES	330032C-1						

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MAGNAVOX PART No.	QUAM PART No.	
	12"	PM	8Ω	583665-1		① Horn type hi frequency speaker.
	12"	PM	8Ω	583666-1		
		PM	6Ω	580039-1 ①		

COILS (RF-IF)

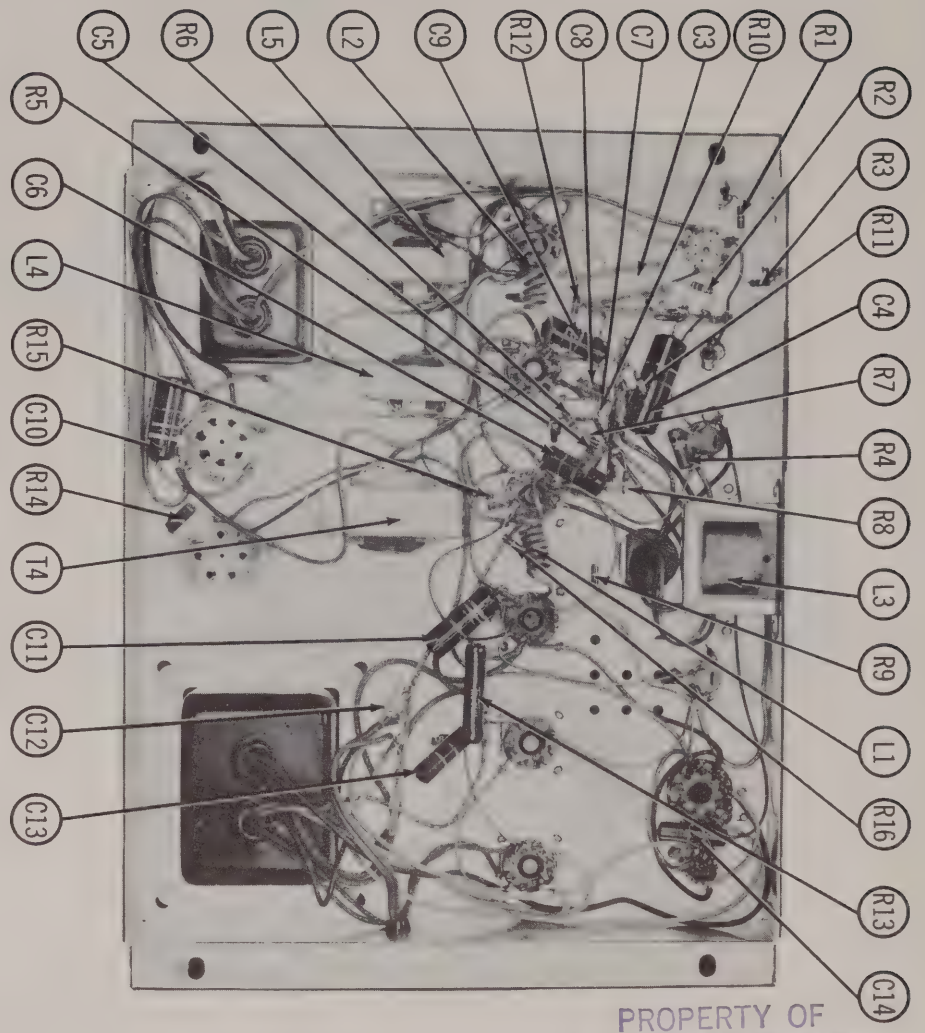
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	MAGNAVOX PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	RF Choke	0Ω		360575-1	19-1002		4606	2 microhenries
L2	RF Choke	0Ω		360575-1	19-1002		4606	2 microhenries

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	MAGNAVOX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L3	.190A	5Ω	1HY	320041-2	C5040 ①	C-2996 ①	C-2327 ①	26C41	C-21X ①
L4	.064A	68Ω	.64HY	350047					
L5	.064A	68Ω	.64HY	350047					

① Drill one new mounting hole.

CHASSIS—BOTTOM VIEW



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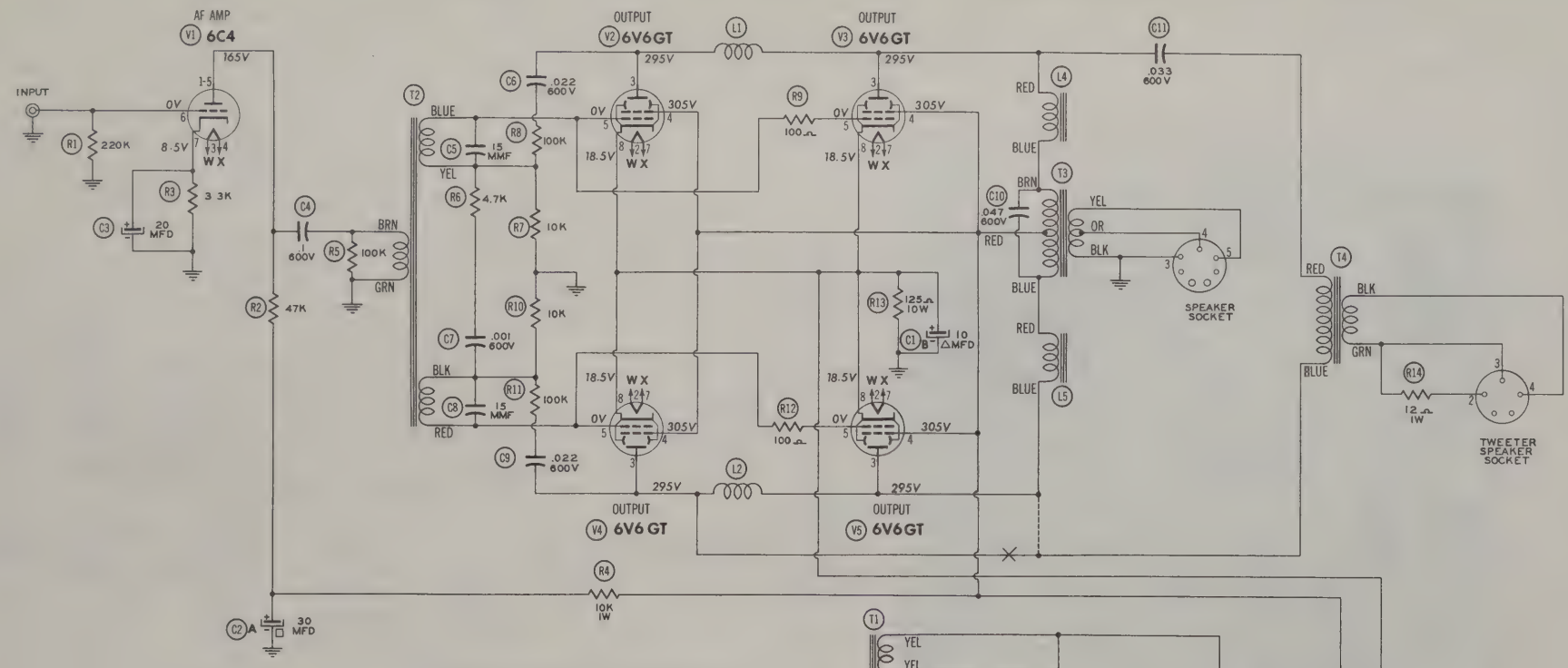
DENVER, COLORADO

MAGNAVOX CHASSIS AMP-144



THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6C4	†57KΩ	NC	175Ω	175Ω	†57KΩ	220KΩ	3.3KΩ	
V 2	6V6GT	NC	175Ω	†220Ω	†50Ω	13KΩ	NC	175Ω	125Ω
V 3	6V6GT	NC	175Ω	†220Ω	†50Ω	13KΩ	NC	175Ω	125Ω
V 4	6V6GT	NC	175Ω	†220Ω	†50Ω	13KΩ	TP	175Ω	125Ω
V 5	6V6GT	NC	175Ω	†220Ω	†50Ω	13KΩ	NC	175Ω	125Ω
V 6	5Y3GT	NC	1Meg	NC	23Ω	NC	23Ω	NC	1Meg
V 7	5Y3GT	NC	1Meg	NC	23Ω	NC	23Ω	NC	1Meg

†MEASURED FROM PIN 8 OF V7.
NC-NO CONNECTION.
TP-TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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MOTOROLA MODELS 55B1 (Ch. HS-486), 55L1, 2, 3, 4 (Ch. HS-470), 55M1, 2, 3 (Ch. HS-472)

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MOTOROLA MODELS 55B1 (Ch. HS-486), 55L1, 2, 3, 4 (Ch. HS-470), 55M1, 2, 3 (Ch. HS-472)

TRADE NAME	Motorola Models 55B1 (Ch. HS-486), 55L1, 2, 3, 4 (Ch. HS-470), 55M1, 2, 3 (Ch. HS-472)
MANUFACTURER	Motorola, Inc., 4545 Augusta Blvd., Chicago 51, Ill.
TYPE SET	Three Power Portable AM Superheterodyne Receiver
TUBES (Four)	Types: 1R5 Conv., 1U4 IF Amp., 1U5 Det.-AVC-AF Amp., 3V4 Output
POWER SUPPLY	110-120 Volts AC-DC (or) 7½ Volts "A" Supply & 90 Volts "B" Supply
RATINGS	.1 Amp. @ 117 Volts AC (or) 50MA @ 7.5 Volts DC & 13 MA @ 90 Volts DC
TUNING RANGE—BROADCAST	535KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Use battery power, if possible. If AC power is used, use an isolation transformer when available. If not, connect a .1MFD capacitor in series with low side of the signal generator and B-.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 6 (grid) of 1R5 (V1). Low side to B-.	455KC (400∿ Mod.)	Tuning Gang fully open	Across Voice Coil	A1, A2, A3	Adjust for maximum output. IF AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.	"	"	1620KC	"	"	A4	"
3.		Loop	1400KC	Tune to 1400KC signal.	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

MOTOROLA
Model 55B1(Ch. HS-486)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	1R5	1R5	7AT	
V2	IF Amp.	1U4	1U4	6AR	
V3	Det.-AVC-AF Amp.	1U5	1U5	6BW	
V4	Audio Output	3V4	3V4	6BX	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: PYRAMID PART No.	REPLACEMENT DATA: SANGAMO PART No.	NOTES
C1A	80	■150	23B633167				
B	60	▲150					
C	250	10					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: MALLORY PART No.	NOTES
C2	.05	200	8B120842			PTS415	
C3	47		21K633231				
C4	10000		21B533471	DD-103	811-01	DC511	
C5A	150		♦21B631414				
B	2000						
C	150						
D	10000						
E	5000						
C6	2000		21K633268	DD-202	801-002	DC522	
C7	.047	400				PT4147	
C8	.25	100	8K122249			PTS4022	
C9	.01	400	8K122334			PTS411	

♦ Items C5A, C5B, C5C, C5D, C5E, R6A, R6B, R6C, and R6D are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: MALLORY PART No.	INSTALLATION NOTES
R1	1Meg	½	18B633267					Volume & Switch (See Note#1)
R1	1Meg	½	18K633172					Volume & Switch (See Note #2)

Note 1. Used in chassis HS-472, and HS-486.
Note 2. Used in chassis HS-470.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	100KΩ	½	6K122313	BTS-100K	
R3	15KΩ	½	6K119934	BTS-15K	
R4	3.3Meg	½	6K119407	BTS-3.3Meg	
R5	390Ω	½	6K122312	BTS-390	
R6A	10Meg	½		BTS-10Meg	
B	4.7Meg	½		BTS-4.7Meg	
C	1Meg	½	♦21B631414	BTS-1Meg	
D	3.3Meg	½		BTS-3.3Meg	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R7	270Ω	½	6K121303	BTS-270	
R8	680Ω	½	6K121744	BTS-680	
R9	2200Ω	8	17A633148		
R10	820Ω	½	6K121302	BTS-820	
R11	150Ω	5	65A633275		

♦ Items C5A, C5B, C5C, C5D, C5E, R6A, R6B, R6C, R6D are combined in one unit.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: Halldorson PART No.	REPLACEMENT DATA: Merit PART No.	REPLACEMENT DATA: Stancor PART No.	REPLACEMENT DATA: Thordarson PART No.	REPLACEMENT DATA: Triad PART No.	NOTES
T1	9.7KΩ	3.3Ω	25K633546		A-2998	A-3329	24S49	S-11X	

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: QUAM PART No.	NOTES
SP1	4A07	PM	3.3Ω	50C633176 50K633443 ①	4A07	① Alternate 4" PM speaker.

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: MEISSNER PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: MILLER PART No.	NOTES
L1	Ant. Coil	.7Ω						Part of handle assembly.
L2	Osc. Coil	2.4Ω	12.5Ω	24B633164				
L3	Input IF	24Ω	24Ω	24K633165	16-6780	BC-352	13-PC1	
L4	Output IF	42Ω	36Ω	24K633166				

SELENIUM RECTIFIER

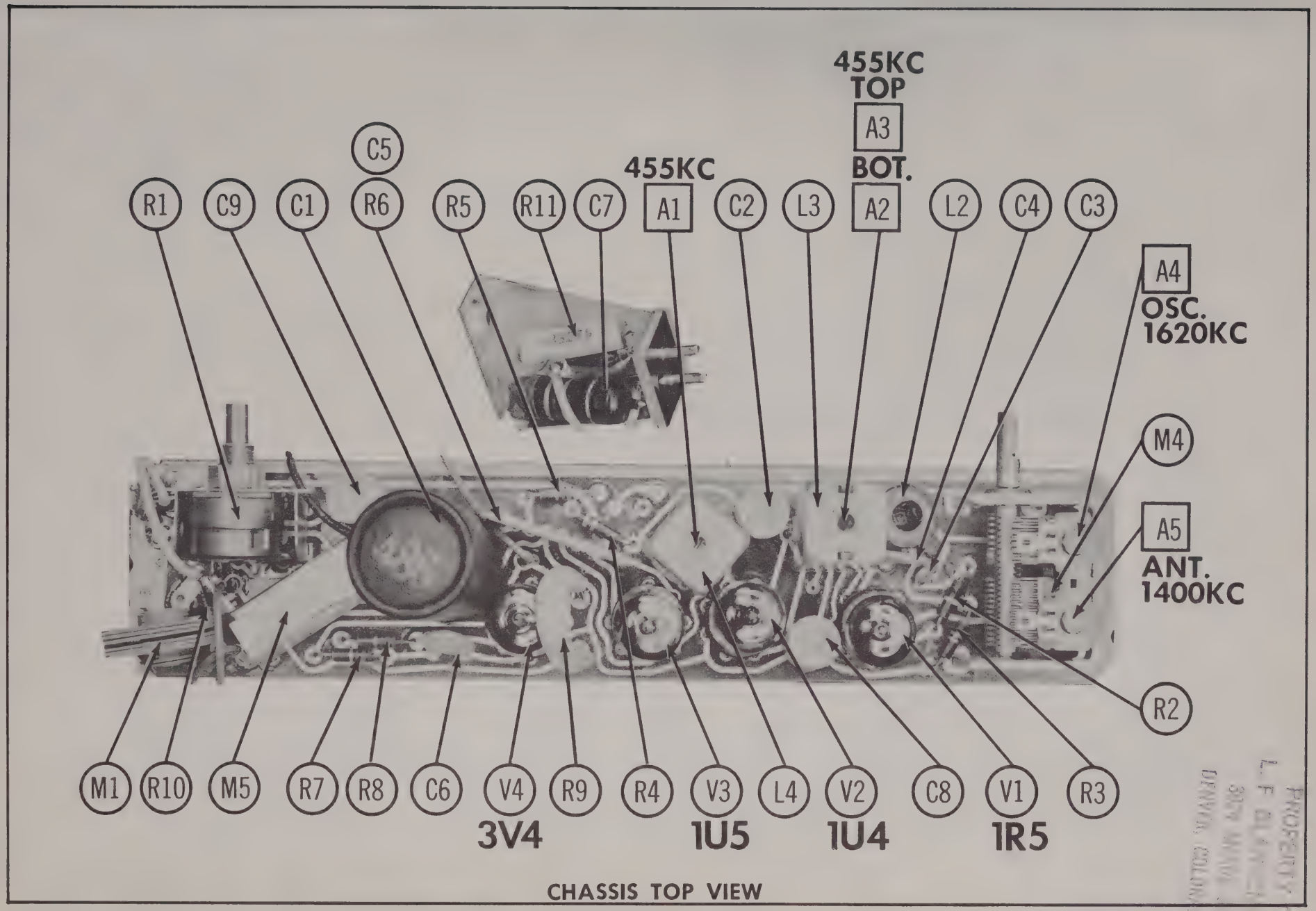
ITEM No.	RATING: CURRENT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: FEDERAL PART No.	REPLACEMENT DATA: INTERNATIONAL PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: RADIO RECEPTOR PART No.	REPLACEMENT DATA: SARKES TARZIAN PART No.	NOTES
M1	.063ADC	48K631295	1263A	RS065	6S65	5M4	65	

BATTERIES

ITEM No.	VOLTAGE	MOTOROLA PART No.	REPLACEMENT DATA: EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
M2	7.5V "A"		717			C5			
M3	.90V "B"			479			P60		

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M4	Tuning Cap.	19K633279	Used in Chassis HS-486
	Tuning Cap.	19K633174	Used in Chassis HS-470
	Tuning Cap.	19B633173	Used in Chassis HS-472
M5	Switch	40B633169	Power Changeover (DPDT)
	Cabinet	1V633287	Model 55B1
	Cabinet	1V633223	Model 55L1
	Cabinet	1V633221	Model 55L2
	Cabinet	1V633220	Model 55L3
	Cabinet	1V633222	Model 55L4
	Cabinet	1V633196	Model 55M1
	Cabinet	1V633195	Model 55M2
	Cabinet	1V633194	Model 55M3
	Handle Assy.	71V630594	Includes ant. coil (L1)-Models 55B1, 55M2
	Handle Assy.	71V630595	Includes ant. coil (L1)-Models 55L1, 55L2, 55L3, 55L4, 55M1, 55M3
	Knob	36C633253	Tuning-1Model 55B1
	Knob	36B633134	Tuning-Models 55L1, 55L2, 55L3, 55L4,
	Knob	36C633135	Tuning-Models 55M1, 55M2, 55M3
	Knob	36K633254	On-Off-Volume-Model 55B1
	Knob	36B633136	On-Off-Volume-Models 55L1, 55L2, 55L3, 55L4
	Knob	36C633143	On-Off-Volume-Models 55M1, 55M2, 55M3
	Knob	36C633142	Dial Scale-Models 55M1, 55M2, 55M3



CHASSIS TOP VIEW

PROPERTY
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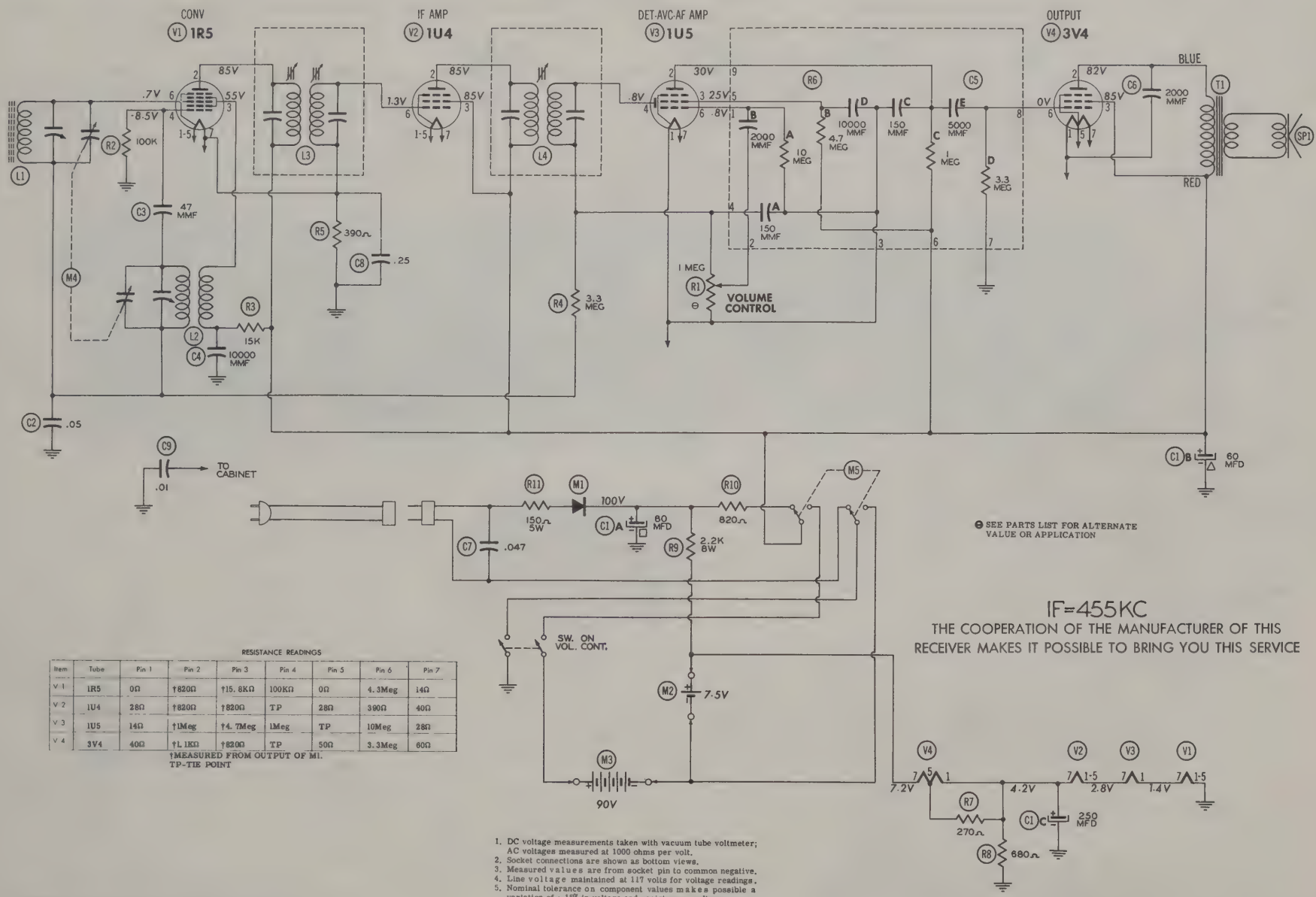
DENVER, COLORADO



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	0Ω	†820Ω	†15. 8KΩ	100KΩ	0Ω	4. 3Meg	14Ω
V 2	1U4	28Ω	†820Ω	†820Ω	TP	28Ω	390Ω	40Ω
V 3	1U5	14Ω	†1Meg	†4. 7Meg	1Meg	TP	10Meg	28Ω
V 4	3V4	40Ω	†L 1KΩ	†820Ω	TP	50Ω	3. 3Meg	60Ω

†MEASURED FROM OUTPUT OF M1.
TP-TIE POINT

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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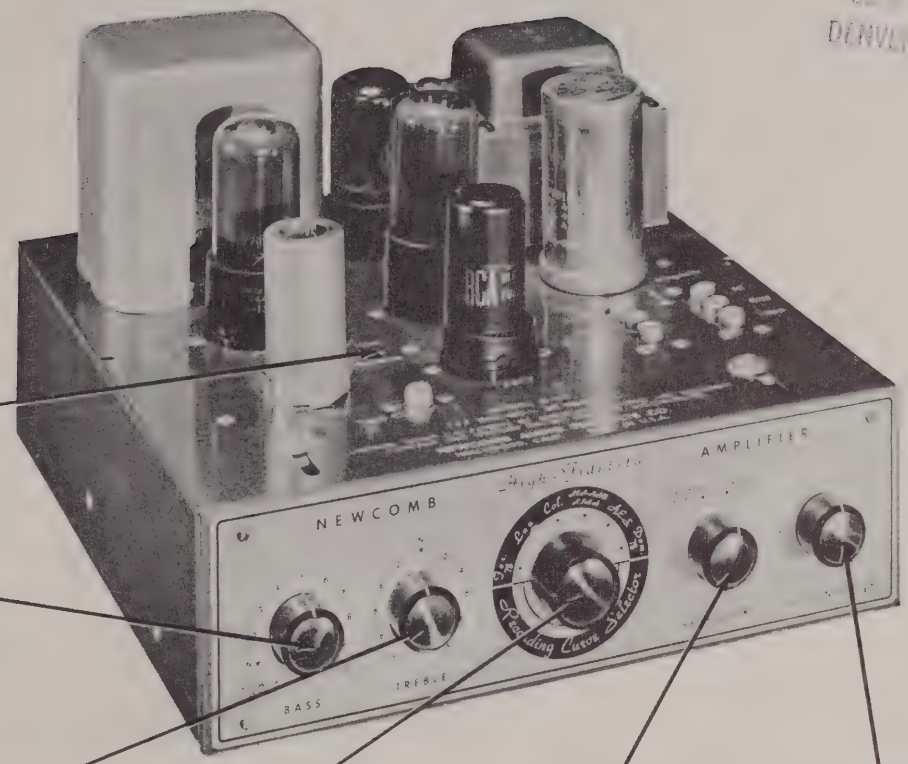

NEWCOMB
MODEL D-10

TRADE NAME	Newcomb Model D-10
MANUFACTURER	Newcomb Audio Products Co., 6824 Lexington Ave., Hollywood, Calif.
TYPE SET	AC Operated 2 Channel Audio Amplifier
TUBES (Five)	Types: 6SC7 Preamp., 12AX7 AF Amp.-Phase Inv., (2) 6V6GT Output, 6AX5GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles
RATING	.26 Amp. @ 117 Volts AC

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PARTS LIST AND DESCRIPTIONS

NEWCOMB
Model D-10

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		NEWCOMB PART No.	STANDARD REPLACEMENT		
V1	Preamp.	6SC7	6SC7	8S	
V2	AF Amp. - Phase Inv.	12AX7	12AX7	9A	
V3	Audio Output	6V6GT	6V6GT	7AC	
V4	Audio Output	6V6GT	6V6GT	7AC	
V5	Rect.	6AX5GT	6AX5GT	6S	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	NEWCOMB PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	475	CE-36	FP396.2	TM-40101O-500	Q-075	
B	■40	475		TC36	TD-25-50		
C	▲10	475					
D	25	50					
C2	4	450	CE-1	TC70	TD-4-450	FM-4504	

FIXED CAPACITORS

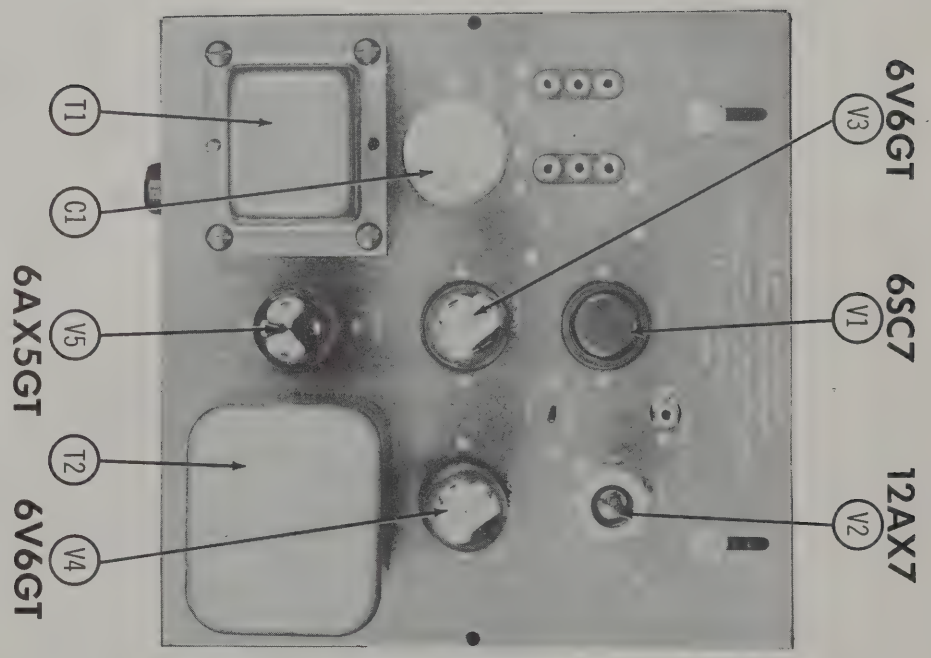
Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	NEWCOMB PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C3	10000		CM-32	DD-103	811-01	DC-511	
C4	.022	600	CP-47	DF-203	817-02	PT6122	
C5	10000		CM-32	DD-103	811-01	DC-511	
C6	47		CM-3	D6-470	GP1K-470	UC-5447	
C7	250		CM-22	D6-251	GP2K-251	UC-5325	
C8	150		CM-23	D6-151	GP2K-151	UC-5315	
C9	1500		CM-27	D6-152	GP2L-152	UC-5215	
C10	.0022	600	CP-48	D6-222	GP2-333-222	PT6222	
C11	10000		CM-32	DD-103	811-01	DC-511	
C12	470		CM-25	D6-471	GP2K-471	UC-5347	
C13	.0033	600	CP-69	D6-332	GP2-333-332	PT6233	
C14	.004	600	CP-66	D6-402	GP2-333-402	PT624	
C15	20000		CM-35	DF-203	817-02	PT612	
C16	47		CM-3	D6-470	GP1K-470	UC-5447	
C17	.047	600	CP-49	DF-503		PT6147	
C18	.047	600	CP-49	DF-503		PT6147	
C19	.047	600	CP-49	DF-503		PT6147	
C20	150		CM-23	D6-151	GP2K-151	UC-5315	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	NEWCOMB PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	5Meg	½	RV-85K	AB-88	A47-5Meg-Z	Q13-141	U-65	Bass
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R1A.
C	Switch		Not Req.	KB-1	SWE-12	76-1	US-26	Attach to R1A.
R2A	5Meg	½	RV-56K		A47-5Meg-S	Q11-141	U-67	Treble
B	Shaft		Not Req.		KSS-3	Not Req.	Not Req.	Attach to R2A.
R3A	1Meg	½	RV-72K	ABT-74	A47F5-1Meg	Q13-137X	UT-443	Loudness tap at 500KΩ
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R3A.
R4	100Ω	2	RV-75					Hum (Wire Wound)

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	NEWCOMB PART No.	IRC PART No.	
R5	56KΩ	½	RR-25	BTS-56K	
R6	56KΩ	½	RR-25	BTS-56K	
R7	18KΩ	½	RR-20	BTS-18K	
R8	100KΩ	½	RR-27	BTS-100K	
R9	5600Ω	½	RR-15	BTS-5600	
R10	180KΩ	½	RR-29	BTS-180K	
R11	180KΩ	½	RR-29	BTS-180K	
R12	18Meg	½	RR-140	BTS-18Meg	
R13	100KΩ	½	RR-27	BTS-100K	
R14	180KΩ	½	RR-29	BTS-180K	
R15	470KΩ	½	RR-33	BTS-470K	
R16	2.7Meg	½	RR-41	BTS-2.7Meg	
R17	1.5Meg	½	RR-39	BTS-1.5Meg	
R18	560KΩ	½	RR-34	BTS-560K	
R19	820KΩ	½	RR-36	BTS-820K	
R20	560KΩ	½	RR-34	BTS-560K	
R21	18Meg	½	RR-140	BTS-18Meg	
R22	100KΩ	½	RR-27	BTS-100K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	NEWCOMB PART No.	IRC PART No.	
R23	12KΩ	½	RR-19	BTS-12K	
R24	27KΩ	½	RR-22	BTS-27K	
R25	39KΩ	½	RR-24	BTS-39K	
R26	56KΩ	½	RR-25	BTS-56K	
R27	18Meg	½	RR-140	BTS-18Meg	
R28	270KΩ	½	RR-31	BTS-270K	
R29	100Ω	½	RR-1	BTS-100	
R30	12KΩ	½	RR-19	BTS-12K	
R31	560KΩ	½	RR-34	BTS-560K	
R32	100KΩ 5%	½	RR-50	BTS-100K 5%	
R33	10KΩ	½	RR-18	BTS-10K	
R34	100KΩ 5%	½	RR-50	BTS-100K 5%	
R35	560KΩ	½	RR-34	BTS-560K	
R36	560KΩ	1	RR-34	BTS-560K	
R37	1200Ω	2	RR-146	BTB-1200	
R38	300Ω 5%	2	RR-130		
R39	3300Ω	½	RR-12	BTS-3300	
R40	6.8Ω	1	RR-149		

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	NEWCOMB PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .26A	660VCT .076ADC	6.3VAC @ 2.74A		TR-175		P-2951 ①		22R02	

① Tap 5V @ 3A winding, and 6.3V center tap.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	NEWCOMB PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7.3KΩ CT	16Ω Tap @ 8Ω	TR-177						

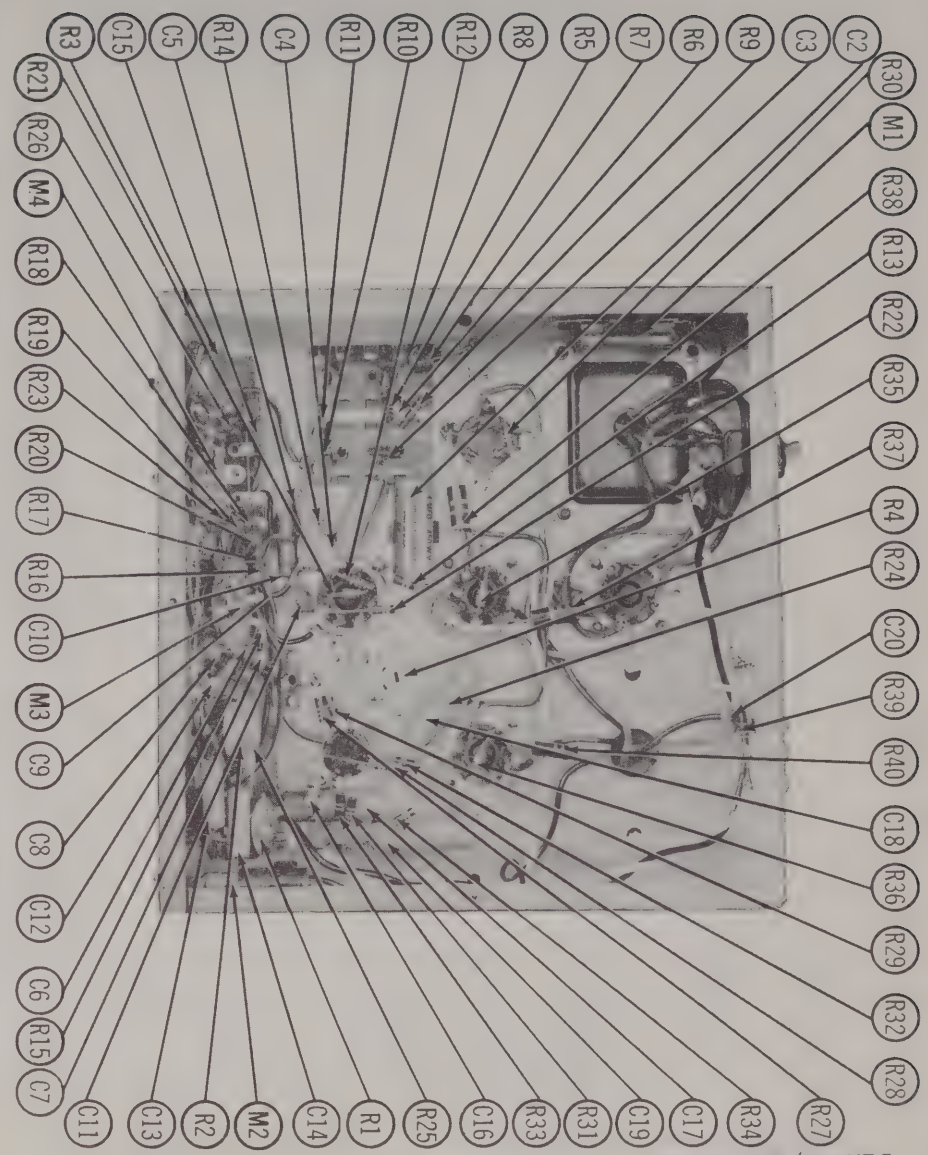
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			NEWCOMB PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	1A 125V			313001. (3AG S/B 1A)	357001	MDL1	4405

MISCELLANEOUS

ITEM No.	PART NAME	NEWCOMB PART No.	NOTES
M2	Pilot Light		#47
M3	Switch	SY-88	Record Compensation (Rotary-Wafer Type)
M4	Switch	SY-79	Selector (Rotary-Wafer Type)

CHASSIS—BOTTOM VIEW



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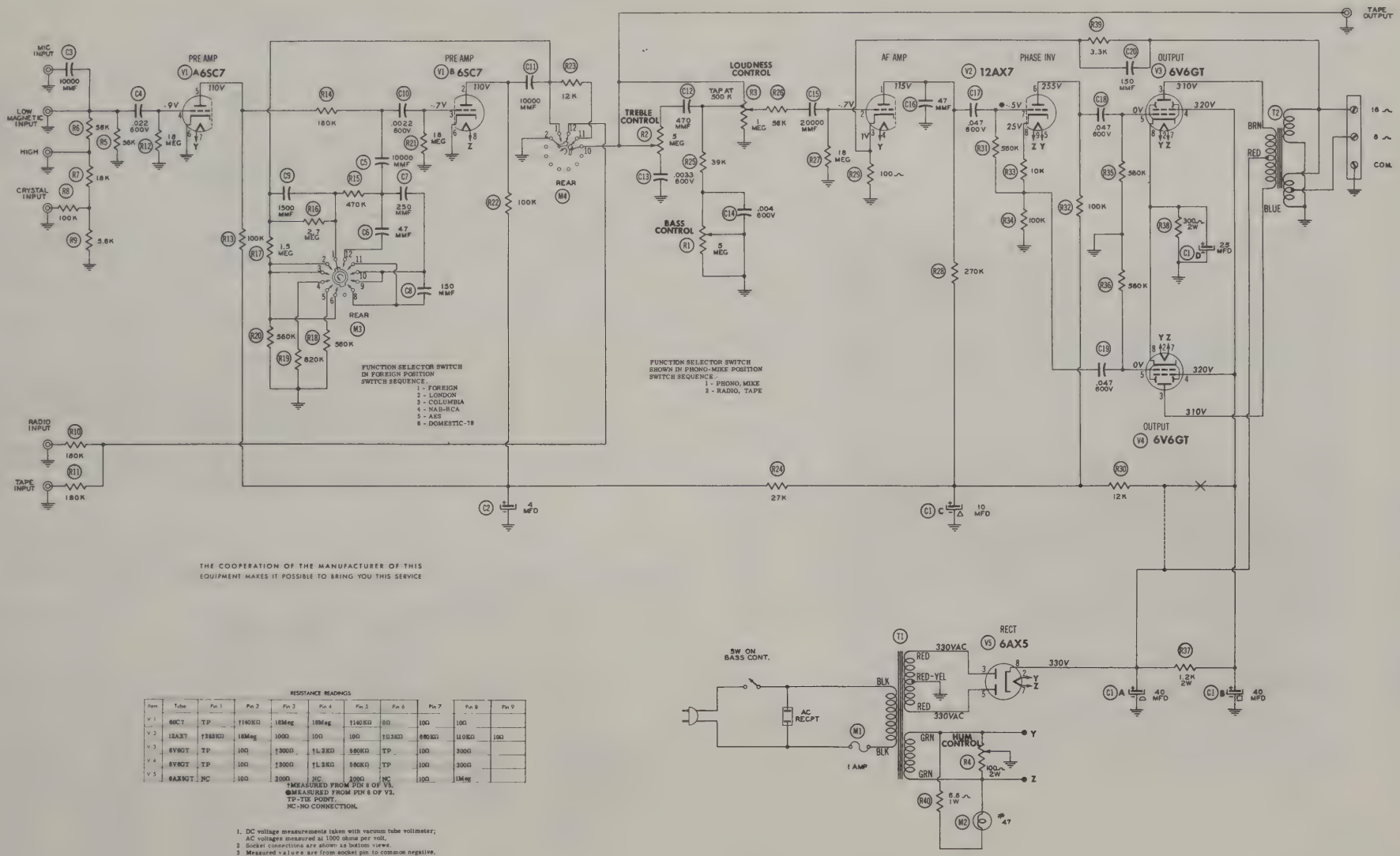
NEWCOMB Model D-10



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6SC7	TP	†140KΩ	18Meg	18Meg	†140KΩ	0Ω	10Ω	10Ω	
V 2	12AX7	†283KΩ	18Meg	100Ω	10Ω	10Ω	†113KΩ	680KΩ	110KΩ	10Ω
V 3	6V6GT	TP	10Ω	†300Ω	†1.2KΩ	580KΩ	TP	10Ω	300Ω	
V 4	6V6GT	TP	10Ω	†300Ω	†1.2KΩ	580KΩ	TP	10Ω	300Ω	
V 5	6AX5GT	NC	10Ω	200Ω	NC	200Ω	NC	10Ω	1Meg	

†MEASURED FROM PIN 8 OF V3.
@MEASURED FROM PIN 8 OF V3.
TP-TIE POINT.
NC-NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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PHOTOFACT* Folder

OLYMPIC MODELS 21CF61, 21CF63, 21CH59, 21CL81, 21TF60, 21TF62, 21TL80 (Ch. AF, AH, AL)

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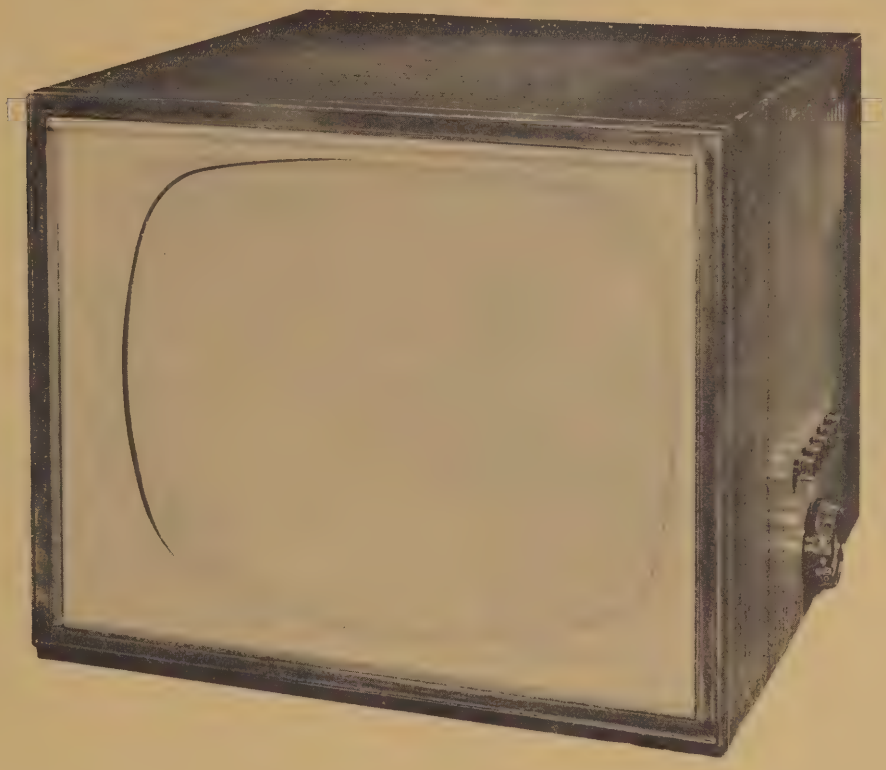

OLYMPIC MODELS 21CF61, 21CF63, 21CH59, 21CL81, 21TF60, 21TF62, 21TL80 (Ch. AF, AH, AL)

OLYMPIC MODEL 21TF62

TRADE NAME	OLYMPIC MODELS	CHASSIS
	21CF61, 21CF63, 21TF60, 21TF62	AF
	21CH59	AH
	21CL81, 21TL80	AL
MANUFACTURER	Olympic Radio & Television, Inc., 30-01 38th Avenue, Long Island City 1, N. Y.	
TYPE SET	Television Receiver	
TUBES	Seventeen	
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 1.4 Amp. @ 117 Volts AC	
TUNING RANGE-	Channels 2 thru 13, Video IF 26.25MC, Sound IF 21.75MC (Intercarrier)	

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*TRADE MARK

OLYMPIC MODELS 21CF61, 21CF63, 21CH59, 21CL81, 21TF60, 21TF62, 21TL80 (Ch. AF, AH, AL)

PROPERTY
L. F. DEAN
DENVER, Colo.

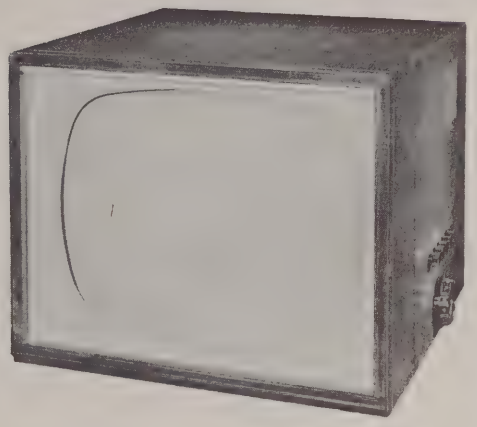
DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 7 push-on type control knobs from side panel of cabinet.
2. Remove 2 metal screws. Remove rear cover.
3. Disconnect speaker plug, picture tube socket, yoke plug and HV lead.
4. Remove wing nut from yoke support.
5. Remove 4 chassis bolts. Remove chassis.
6. Remove 2 speaker nuts. Remove speaker.

PICTURE TUBE REMOVAL

1. Remove 2 bolts holding mounting board to cabinet.
2. Remove ion trap and centering magnet.
3. Remove 1 hex nut holding strap.
4. Remove picture tube.



MODELS	CHASSIS
21CF61, 21CF63, 21TF60, 21TF62	AF
21CH59	AH
21CL81, 21TL80	AL

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet to the right of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 3 wood screws holding wood strip at the top edge of safety glass. Remove wood strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (B1) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the buzz control (R8) for maximum volume and minimum buzz.

FUSES

One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

OLYMPIC MODELS 21CF61, 21CF63, 21CH59, 21CL81, 21TF60, 21TF62, 21TL80 (Ch. AF, AH, AL)

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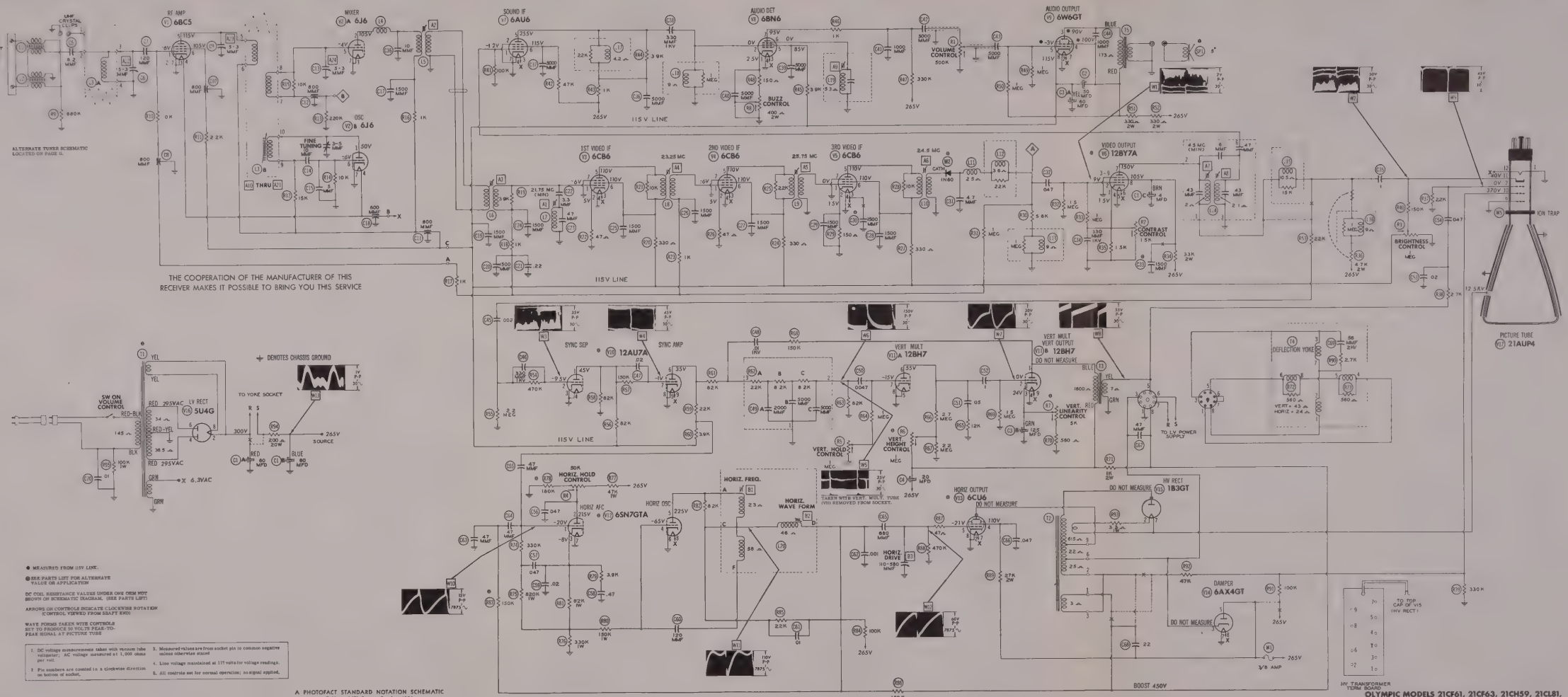
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
ALTERNATE TUNER SCHEMATIC LOCATED ON PAGE 11.
RF AMP V1 6BC5
MIXER V2A 6J6
OSC V2B 6J6
SOUND IF V7 6AU6
AUDIO DET V8 6BN6
AUDIO OUTPUT V9 6W6GT
1ST VIDEO IF V3 6CB6
2ND VIDEO IF V4 6CB6
3RD VIDEO IF V5 6CB6
VIDEO OUTPUT V6 12BY7A
SYNC SEP V10 12AU7A
SYNC AMP
VERT MULT V11A 12BH7
VERT MULT V11B 12BH7
HORIZ OSC V12 6SN7GTA
HORIZ OUTPUT V13 6CU6
HV RECT V15 1B3GT
DAMPER V14 6AX4GT
PICTURE TUBE V17 21AUP4
115V LINE
SW ON VOLUME CONTROL
RED 295VAC
LV RECT V16 5U4G
RED-BLK
RED-YEL
BLK
GRN
6.3VAC
TO YOKE SOCKET
SOURCE
DENOTES CHASSIS GROUND
VOLUME CONTROL 500K
BUZZ CONTROL
CONTRAST CONTROL 1.5K
BRIGHTNESS CONTROL
VERT. HOLD CONTROL
VERT. HEIGHT CONTROL
VERT. LINEARITY CONTROL 5K
HORIZ. HOLD CONTROL 50K
HORIZ. FREQ.
HORIZ. WAVE FORM
HORIZ AFC
HORIZ DRIVE
DEFLECTION YOKE
VERT = 43
HORIZ = 24
ION TRAP
TO LV POWER SUPPLY
TO TOP CAP OF V15 (HV RECT)
HV TRANSFORMER TERM BOARD
BOOST 450V
DO NOT MEASURE
TAKEN WITH VERT. MULT. TUBE (V11) REMOVED FROM SOCKET.
3/8 AMP
◆ MEASURED FROM 115V LINE.
◉ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM MAY BE SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated
4. Line voltage maintained at 115 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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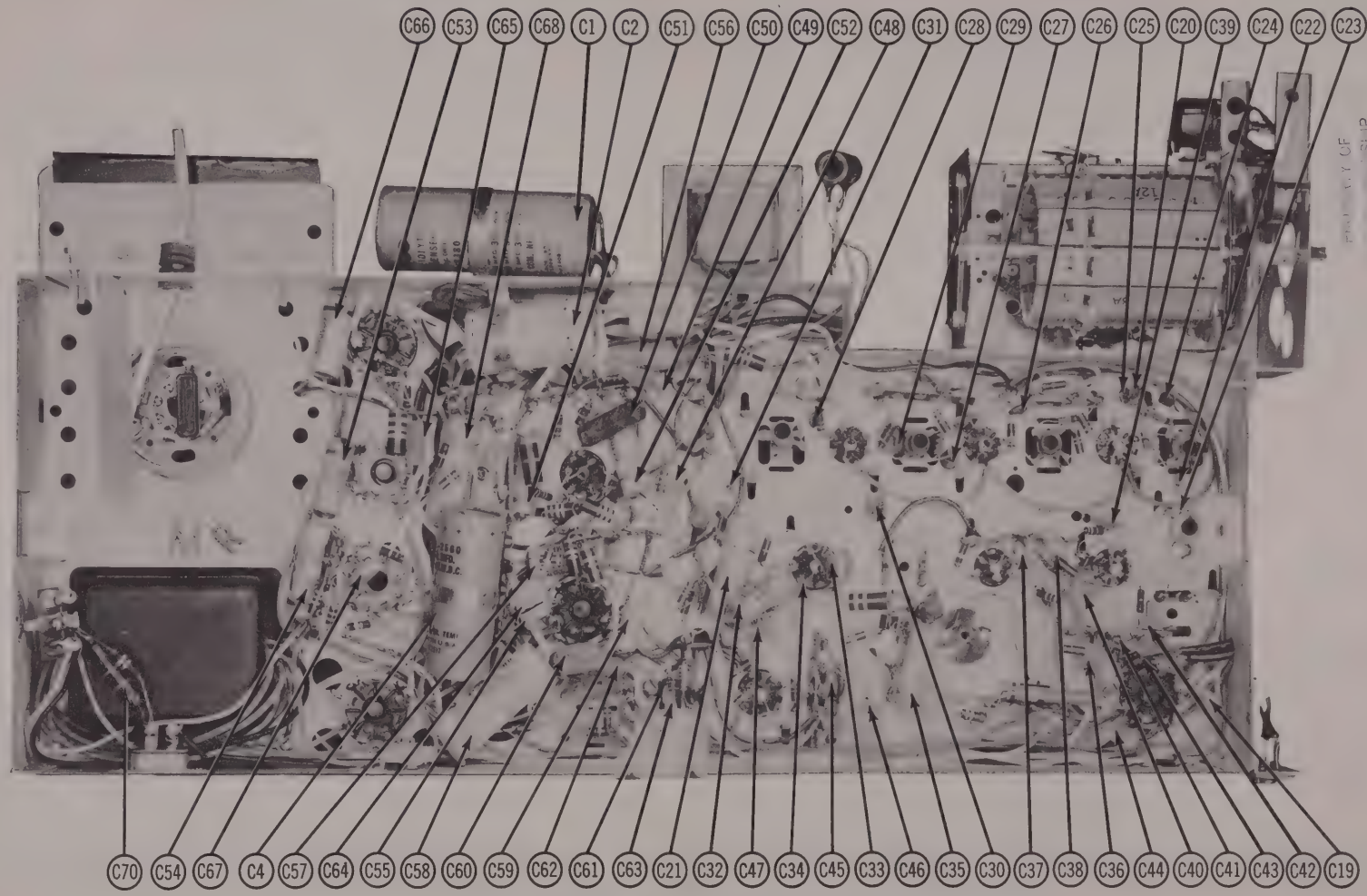
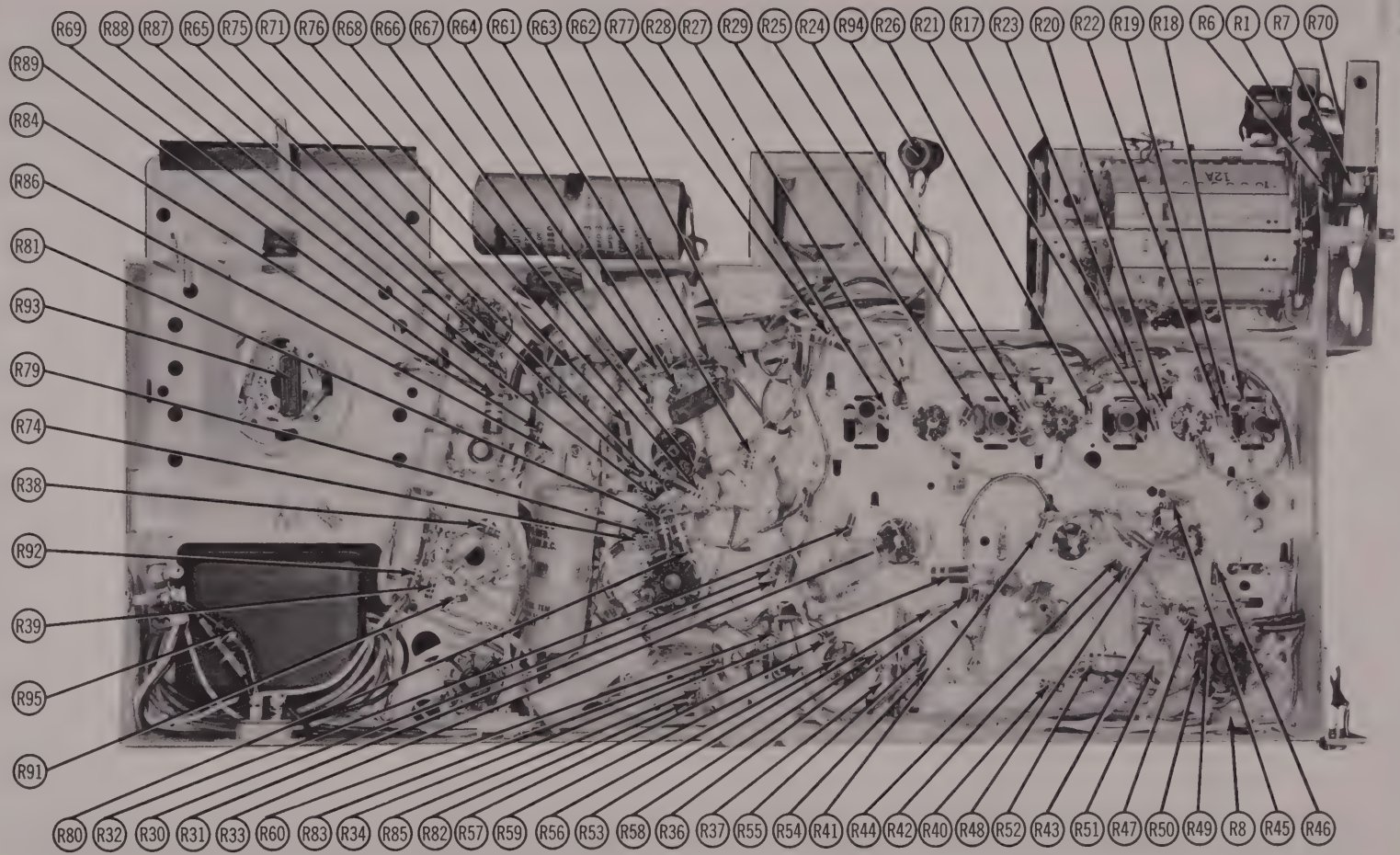
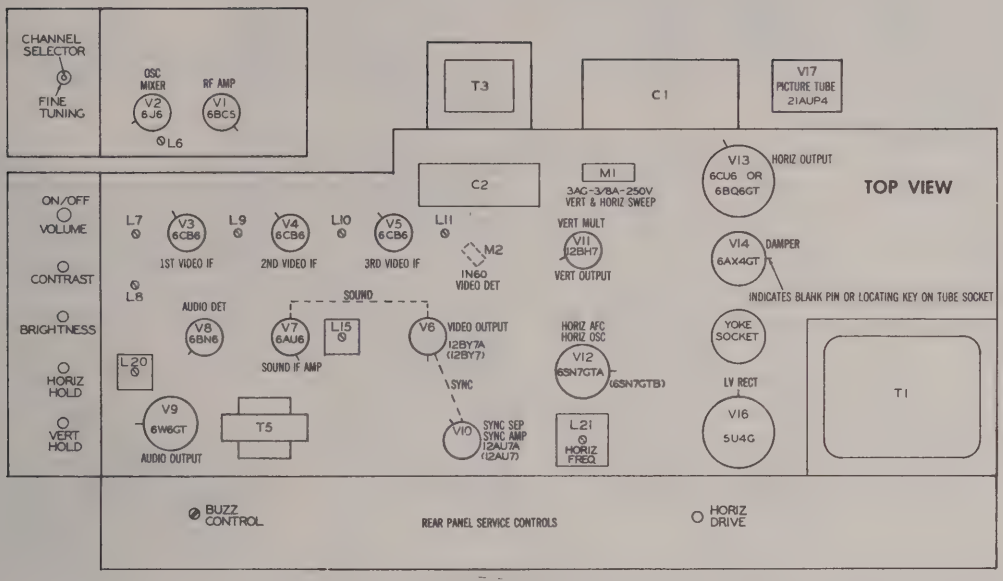


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound -V16

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6, V9
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V17
Has pic, no sound - V7 , V8, V9

SYNC FAILURE
No vert. sync - V10, V11
No horiz. sync - V10, V12
No vert. or horiz. sync - V10

SWEEP FAILURE
No raster, has sound - V12, V13, V14, V15, V17, Fuse (M1)
No vertical deflection - V11
Poor vert. linearity or foldover - V11
Poor horiz. linearity or foldover - V12, V13, V14
Narrow picture - V12, V13, V14, V15, V16
Vert. off freq. - V10, V11
Horiz. off freq. - V10, V12

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis. Do not remove the horizontal oscillator tube (V12) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) from its socket and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Use lowest DC scale on VTVM.
If oscillation occurs during alignment (varying signal generator output will have no effect on VTVM reading) detune A6 and adjust A4 and A5 as in steps 3 and 4, then adjust A6 as in step 5. In steps 2 and 6 use only enough sweep generator output for useable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube (V2). Low side to chassis.	Not used	21.75MC (Unmod)	Any	Use VTVM. DC probe thru 100KΩ to point (A). Common to chassis.	A1	Adjust for MINIMUM deflection.
2.	"	"	24MC (10MC Swp.)	21.75MC 22.75MC 26.25MC	"	Vert. Amp. thru detector (Fig.1) to pin 5 (plate) of 1st. video IF tube (V3). Low side to chassis.	A2, A3	Connect a clip lead across C21. This shorts out AGC line. Remove the 3rd. video IF amplifier tube (V5) from its socket. Adjust A2 and A3 for response curve similar to Fig. 2 with marker positions as shown. Peaks should be of equal amplitude. Remove short from AGC line and replace V5 in its socket.
3.	"	"	Not used	23.25MC (Unmod)	"	Use VTVM. DC probe thru 100KΩ to point (A). Common to chassis.	A4	Adjust for maximum deflection.
4.	"	"	"	25.75MC	"	"	A5	"
5.	"	"	"	24.5MC	"	"	A6	"
6.	"	"	24MC (10MC Swp)	21.75MC 23.0MC 26.25MC	"	Vert. Amp. to point (A). Low side to chassis.		Connect negative lead of a 1.5 volt bias battery to ungrounded side of C21. Connect the positive lead to chassis. Check for response similar to Fig. 3. If necessary, slightly retouch A4, A5 and A6. A5 affects high frequency side. A4 affects low frequency side. A6 affects top position of curve.

4.5MC TRAP ALIGNMENT

Remove 3rd Video IF amplifier tube (V5) from its socket.
Set contrast control fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod.)	Any	DC probe thru detector (Fig. 4) to pin 11 (cathode) of picture tube. Common to chassis.	A7	Adjust for MINIMUM deflection. Use maximum signal generator output. Replace V5 in its socket.

ALTERNATE 4.5MC TRAP ALIGNMENT

Replace original 6J6 in its socket and tune in a local TV station. Adjust fine tuning control to emphasize 4.5MC beat interference in picture. Adjust A7 to minimize the 4.5MC beat in the picture.

SOUND IF ALIGNMENT USING ON THE AIR SIGNAL

Connect the DC probe of a VTVM to pin 2 of the audio detector tube (V8). Common to chassis. Replace the original 6J6 in its socket. Turn set on and tune in a strong TV signal. Adjust A8 for maximum deflection on VTVM. Disconnect VTVM from receiver. Set the buzz control (R8) to its mid-range position. Adjust the quadrature coil slug A9 for maximum volume. Adjust R8 for maximum volume with minimum buzz. Retouch A8 for maximum volume.

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket. Connect bias as in step 6 of "Video IF Alignment".
The channel oscillator adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A10	Adjust to place sound marker in trap notch as in Fig. 5. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A11	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A12	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A13	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A14	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A15	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A16	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A17	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A18	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A19	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A20	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A21	

ALIGNMENT INSTRUCTIONS (cont)

RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A22, A23, A24	Adjust for response curve similar to Fig.6 with markers above 90%.
10.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response curve similar to Fig.6. If markers fall below 70% on any channel, make compromise adjustment of A22, A23 and A24 with channel switch set to that channel. Recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

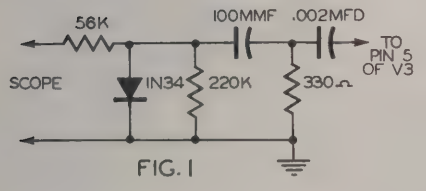


FIG. 1

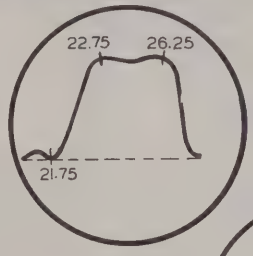


FIG. 2

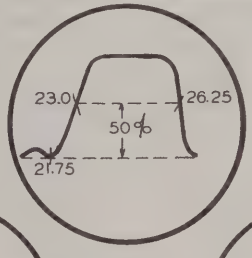


FIG. 3

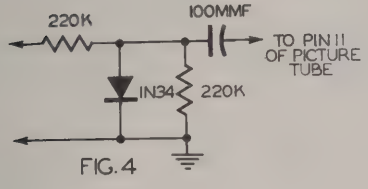


FIG. 4

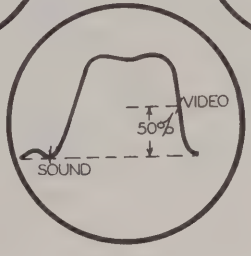


FIG. 5

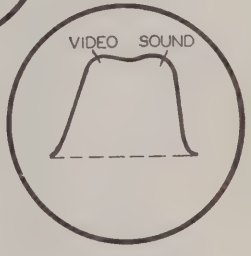
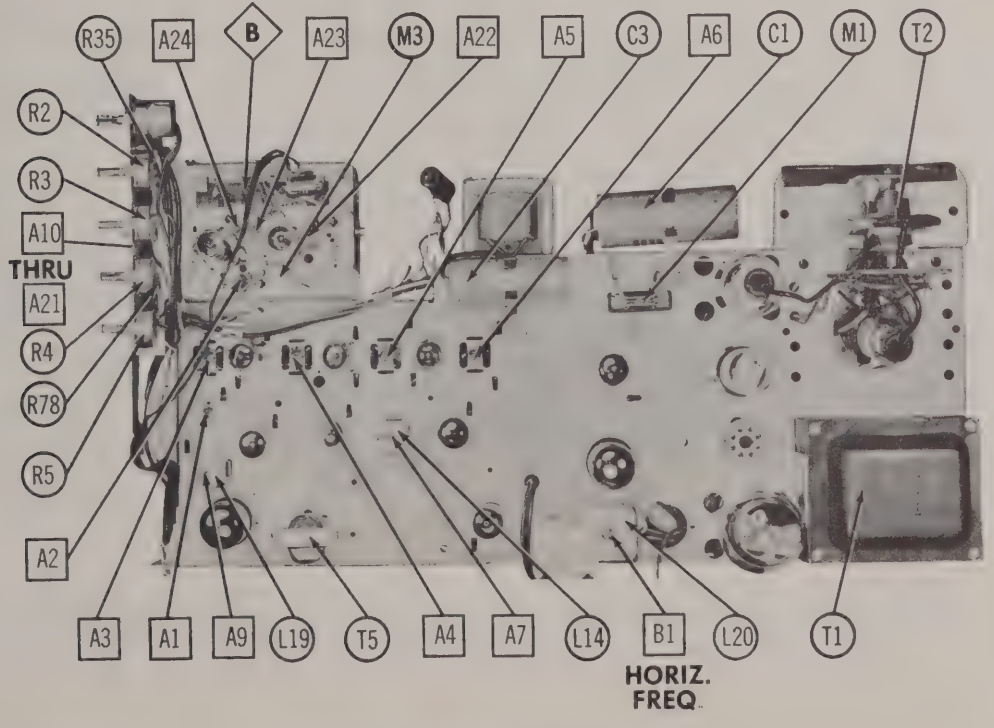


FIG. 6



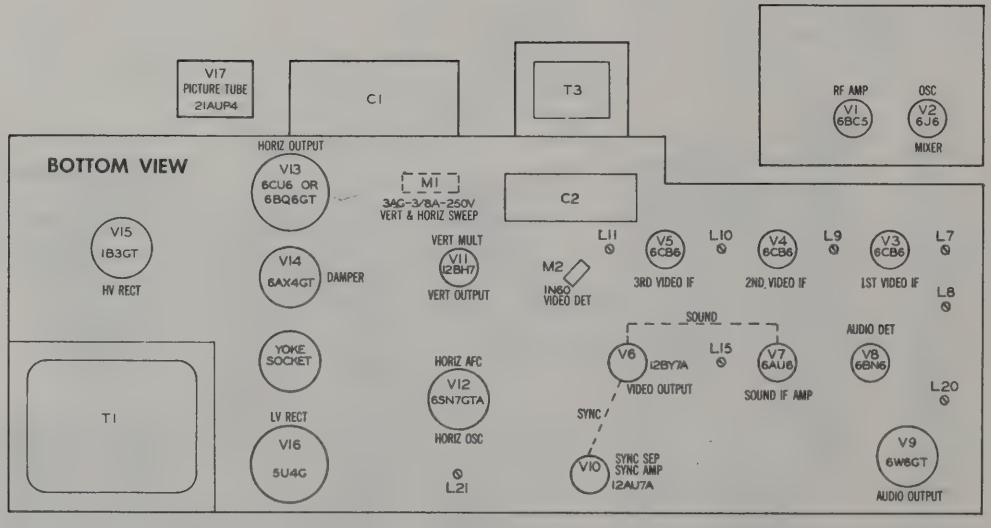
CHASSIS TOP VIEW

OLYMPIC MODELS 21CF61, 21CF63, 21CH59, 21CL81, 21TF60, 21TF62, 21TL80 (Ch. AF, AH, AL)

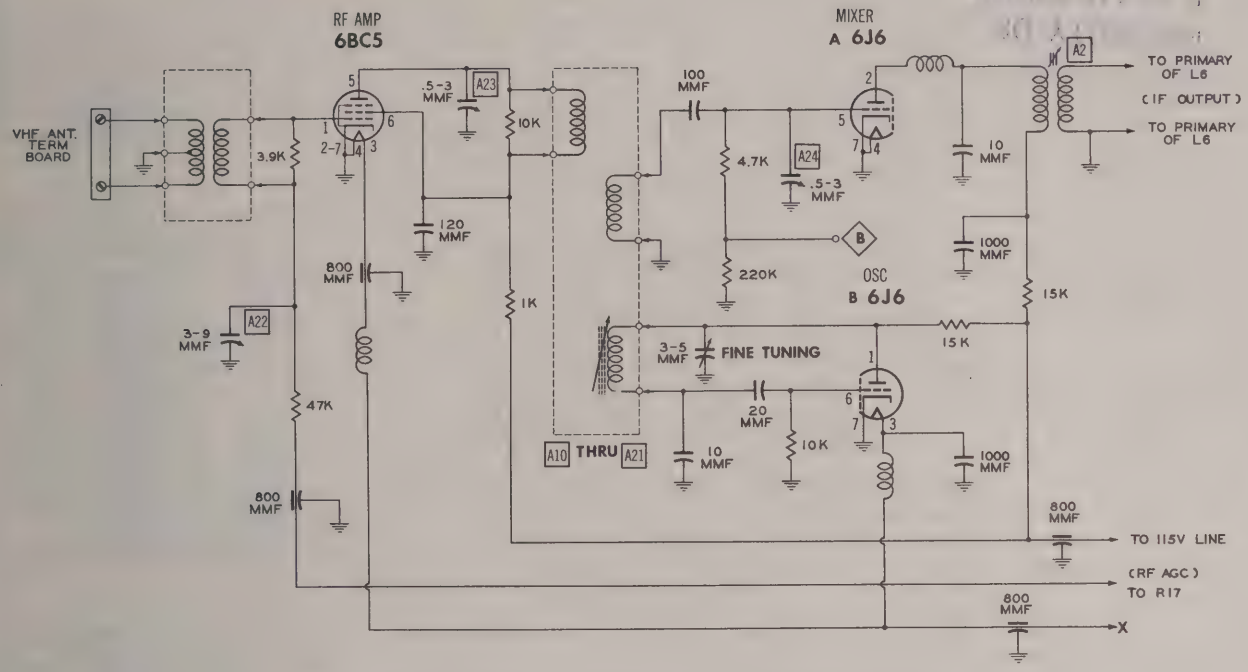
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BC5	1Meg	0Ω	0Ω	.1Ω	■0Ω	■2.2KΩ	0Ω		
V 2	6J6	■15KΩ	■1KΩ	0Ω.	.1Ω	220KΩ	10KΩ	0Ω		
V 3	6CB6	1Meg	47Ω	.1Ω	0Ω	■330Ω	■330Ω	0Ω		
V 4	6CB6	1Meg	47Ω	.1Ω	0Ω	■330Ω	■330Ω	0Ω		
V 5	6CB6	.3Ω	150Ω	.1Ω	0Ω	■330Ω	■330Ω	0Ω		
V 6	12BY7A	65Ω	700KΩ	0Ω	0Ω	0Ω	.1Ω	†5KΩ	†33KΩ	0Ω
V 7	6AU6	100KΩ	0Ω	.1Ω	0Ω	†1.2KΩ	†47KΩ	0Ω		
V 8	6BN6	350Ω	9Ω	.1Ω	0Ω	■3.9KΩ	5.3Ω	†330KΩ		
V 9	6W6GT	0Ω	0Ω	†1KΩ	†900KΩ	500KΩ	TP	.1Ω	60KΩ	
V 10	12AU7A	■60KΩ	2.7Meg	0Ω	0Ω	0Ω	■26KΩ	200KΩ	0Ω	.1Ω
V 11	12BH7	▲2.6KΩ	1.5Meg	2.5KΩ	0Ω	0Ω	▲3Meg	1.3Meg	0Ω	.1Ω
V 12	6SN7GTA	1.5Meg	†50KΩ	400KΩ	500KΩ	†100KΩ	0Ω	0Ω	.1Ω	
V 13	6CU6	TP	0Ω	TP	†27KΩ	470KΩ	TP	.1Ω	0Ω	TOP CAP ▲22Ω
V 14	6AX4GT	NC	NC	130KΩ	NC	†200Ω	TP	0Ω	.1Ω	
V 15	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲635Ω
V 16	5U4G	NC	70KΩ	NC	37Ω	NC	34Ω	NC	70KΩ	
V 17	21AUP4	0Ω	22KΩ	PIN 6 0Ω	PIN 10 ▲47KΩ	PIN 11 ■350KΩ	PIN 12 .1Ω			

■MEASURED FROM 115V LINE.
†MEASURED FROM PIN 2 OF V16.
▲MEASURED FROM PIN 3 OF V14.
TP-TIE POINT.
NC-NO CONNECTION.



TUBE PLACEMENT CHART



VHF TUNER PART NO. CL-3865-1 USED WITH "AF" CHASSIS, H SERIES

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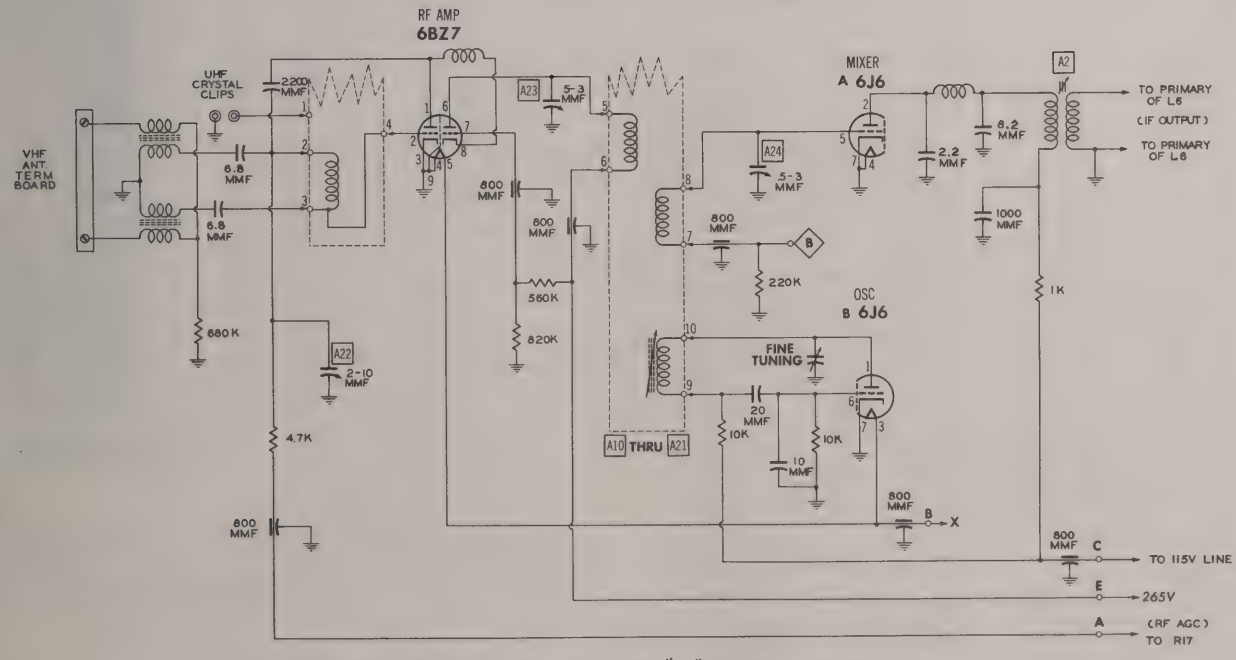
ALTERNATE TUNER SCHEMATIC



VHF TUNER PART NO. CL-3993 USED WITH "AH" CHASSIS, TC SERIES; AND
VHF TUNER PART NO. CL-3929 USED WITH "AL" CHASSIS, TC SERIES

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ALTERNATE TUNER SCHEMATIC

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: OLYMPIC PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BC5	6BC5	7BD	
V2	Mixer-Osc.	6J6	6J6	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Output	12BY7A	12BY7A	9BF	12BY7 may be used as an alternate.
V7	Sound IF Amp	6AU6	6AU6	7HK	
V8	Audio Det.	6BN6	6BN6	7JJ	
V9	Audio Output	6W6GT	6W6GT	7AC	
V10	Sync Separator-Sync Amplifier	12AU7A	12AU7A	9A	12AU7 may be used as an alternate.
V11	Vert. Mult.-Vert. Output	12BH7	12BH7	9A	
V12	Horiz. AFC-Horiz. Osc.	6BN7GTA	6BN7GTA	8MD	6BN7GT may be used as an alternate.
V13	Horiz. Output	6CU6	6CU6	9AM	6BQ6GT may be used as an alternate.
V14	Damper	5AX4GT	5AX4GT	6CG	
V15	HV Rectifier	1B3GT	1B3GT	8C	
V16	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: OLYMPIC PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V17	21AUP4 21AUP4A ①	21AUP4A ①		21AUP4 21AUP4A ② 21AUP4A, B ②	21AUP4A ①	13L 13L 13L	① Aluminized ② Silver screen

ELECTROLYTIC CAPACITORS

ITEM No	RATING: CAP.	VOLT.	REPLACEMENT DATA: OLYMPIC PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1A	60	350	CO5390	WT-630		C-Q-012	
B	60	350				MT-4504	
C	4	350					
C2	50	250	CO2968	TC59	TD-50-450	FM-2540	
C3A	80	200	CO3858	WD-340		T-535	
B	125	50					
C4	20	450	CO2560	TC75	TD-20-450	FM-4520	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: OLYMPIC PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C5	8.3				NPOA-8R3		
C6	.5-3			829-3	3125-01-QR5	CT565A	
C7	180			DD-181	811-021	UC-5313	
C8	800						
C9	5-3			829-3	3125-01-QR5	CT565A	
C10	800						
C11	800						
C12	800						
C13	.5-3			829-3	3125-01-QR5	CT565A	
C14	10						
C15	5						
C16	10			TCE-10	NPOA-100	ZT-541	
C17	1500			DD-152	801-0015	DC-5215	
C18	800						
C19	1500		CCD-152X	DD-152	801-0015	DC-5215	
C20	1500		CCD-152X	DD-152	801-0015	DC-5215	
C21	.22	200	CO-H-2224		PT4022		
C22	3.3		CO2458	TCZ-3R3	NPOA-3R3	ZT-5553	
C23	47			TCN-47	N750K-470	NT-5447	
C24	1500		CCD-152X	DD-152	801-0015	DC-5215	
C25	1500		CCD-152X	DD-152	801-0015	DC-5215	
C26	1500		CCD-152X	DD-152	801-0015	DC-5215	
C27	1500		CCD-152X	DD-152	801-0015	DC-5215	
C28	1500		CCD-152X	DD-152	801-0015	DC-5215	
C29	5000		CCD-502X	DD-502	811-005	DC-525	
C30	1500		CCD-152X	DD-152	801-0015	DC-5215	Note 1
C31	4.7		CO1083	TCZ-4R7	NPOA-4R7	ZT-5547	
C32	.047	400	CO-H-4473	DF-503		PT4147	
C33	1500		CCD-152X	DD-152	801-0015	DC-5215	Note 1
C34	330	1000	CCD-331M	DD-331	IR5KV-331	DC30333	
C35	.1	400	CO-H-4104	DF-104		PT401	
C36	5000		CCD-502X	DD-502	811-005	DC-525	
C37	5000		CCD-502X	DD-502	811-005	DC-525	
C38	330	1000	CCD-331M	DD-331	IR5KV-331	DC30333	
C39	5000		CCD-502X	DD-502	811-005	DC-525	
C40	5000		CCD-502X	DD-502	811-005	DC-525	
C41	1000		CCD-102M	DD-102	801-001	DC-521	
C42	5000		CCD-502X	DD-502	811-005	DC-525	
C43	5000		CCD-502X	DD-502	811-005	DC-525	
C44	10000		CCD-103X	DD-103	811-01	DC-511	
C45	.003	600	CO-H-4302	DF-302	GP3-333-302	PT332	
C46	330	1000	CCD-331M	DD-331	IR5KV-331	DC30333	
C47	.02	400	CO-H-4303	DF-203	817-02	PT432	
C48	.01	1000	CO-H-4103	DF-103		PT401	
C49A	2000					DC-522	
B	5000		+PC2435	+PC-100	+1405-01	DC-525	
C	5000					DC-525	
C50	.0047	600	CO-G-6472K			MCB465	
C51	.05	400	CO-H-4473	DF-503		PT415	
C52	.1	400	CO-H-4104	DF-104		PT401	
C53	.02	400	CO-H-4203	DF-203	817-02	PT432	
C54	.047	400	CO-H-4473	DF-503		PT4147	
C55	47	500	RCM15C470K	D8-470	831-470	MCB225	
C56	.047	400	CO-H-4473	DF-503		PT4147	
C57	.047	400	CO-H-4473	DF-503		PT4147	
C58	.47	200	CO-H-5474			PT4047	
C59	.02	400	CO-H-4203	DF-203	817-02	PT432	
C60	120	500	RCM20C121K	D4-121	831-121	MCB235	
C61	.01	600	CO-G-6103	D8-103	GP3-333-103	PT611	
C62	.001	600	CO-G-6102K			MCB255	
C63	47	500	RCM15C470K	D8-470	831-470	MCB225	
C64	47	500	RCM15C470K	D8-470	831-470	MCB225	
C65	680	500	RCM20A681M	D8-681	811-681		

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING: CAP.	VOLT.	REPLACEMENT DATA: OLYMPIC PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C66	.047	400	CO-H-4473	DF-503		PT4147	
C67	47	3000	CO3623	DD30-470	3KV-470	DC30447	
C68	.33	400	CO-H-4234			PT4033	
C69	56	2000	CCD-560X	DD30-560	3KV-560	DC30456	
C70	.01	600	CO-G-6103	DD-103	GP3-333-103	PT611	

Note 1. Not used in some versions.
* Items C49A, C49B, C49C, R62A, R62B and R62C are combined in one unit.

CONTROLS

ITEM No	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	1	PT3615	AB-50	A47-500K-Z	Q13-133	U-46	Volume
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	U-54	Attach to R1A.
C	Switch		Not Req.	KS-1	SWR-12	78-1	US-26	Attach to R1A.
R2A	150Ω	½	PT2611	AB-515		Q17-109	U-5	Contrast
B	Shaft		Not Req.	AK-4		Not Req.	Not Req.	Attach to R2A.
R3A	1Meg	½	PT3616	AB-69	A47-1Meg-S	Q11-127	U-54	Brightness
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R3A.
R4A	50KΩ	½	PT3617	AB-31	A47-50K-S	Q11-123	U-35	Horizontal Hold
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R4A.
R5A	1 Meg	½	PT3618	AB-69	A47-1Meg-S	Q11-137	U-54	Vertical Hold
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R5A.
R6A	1Meg	½	PT2665	BX-59	A47-1Meg-S	Q11-127	SU-54	Vertical Height
B	Shaft		Not Req.	Not Req.	FKS-1-1/4	SQ	Not Req.	Attach to R6A.
R8	1Meg	½	PT2666-1					Vertical Height (See Note 1)
R7A	500Ω	½	PT2619	AB-10	A47-500Ω-S	Q11-114	SU-34	Vertical Linearity
B	Shaft		Not Req.	AK-1	FKS-1/4	SQ	Not Req.	Attach to R7A.
R7	500Ω	½	PT2619-1					Vertical Linearity (See Note 1)
R8	400Ω	2	PT361		39-500			Buzz (Wire Wound)

Note 1. Used as an alternate in some versions.

RESISTORS

ITEM No.	RATING: OHMS	WATTS	REPLACEMENT DATA: OLYMPIC PART No.	IRC PART No.	NOTES
R9	680Ω	½			
R10	10KΩ	½	REB103K		
R11	2200Ω	½		BTS-2200	
R12	5MΩ	½			
R13	330KΩ	½			
R14	100Ω	½	REB103K		
R15	10KΩ	½	REB103K		
R16	1000Ω	½	REB102K	BTS-1000	
R17	1000Ω	½	REB102M	BTS-1000	
R18	1000Ω	½	REB302M	BTS-1000	
R19	3900Ω	½	REB392K	BTS-3900	
R20	330Ω	½	REB331M	BTS-330	
R21	10KΩ	½	REB103K		
R22	47Ω	½	REB470M	BTS-47	
R23	1000Ω	½	REB102M	BTS-1000	
R24	330Ω	½	REB331M	BTS-330	
R25	22KΩ	½	REB223K		
R26	47Ω	½	REB470M	BTS-47	
R27	330Ω	½	REB331M	BTS-330	
R28	10KΩ	½	REB103K	BTS-10K	
R29	150Ω	½	REB151M	BTS-150	
R30	5800Ω	½	REB582K		
R31	1Meg	½	REB105M	BTS-1Meg	
R33	1.5Meg	½	REB155K		
R34	33KΩ	½	REB333M		
R35	1000Ω	1	REB102M	BTS-1000	
R36	4700Ω	2	RED472K		
R37	22KΩ	2	RED223M		
R38	2700Ω	2	RED272K		
R39	330KΩ	2	REB334K-A		
R40	150KΩ	1	REB154K		
R41	100KΩ	1	REB104M	BTS-100K	
R42	47KΩ	1	REB473M	BTS-47K	
R43	1000Ω	1	REB102M	BTS 1000	
R44	3900Ω	1	REB392K	BTS-3900	
R45	3900Ω	1	REB392K	BTS-3900	
R46	1000Ω	1	REB102M	BTS-1000	
R47	330KΩ	1	REB334K-A	BTS-330K	
R48	150Ω	1	REB151M	BTS-150	
R49	1Meg	1	REB105K	BTS-1Meg	
R50	1Meg	1	REB105K	BTS-1Meg	
R51	330Ω	2	RED331M	BTS-330	
R52	330Ω	1	REB331M	BTS-330	
R53	22KΩ	1	REB223M		

ITEM No.	RATING: OHMS	WATTS	REPLACEMENT DATA: OLYMPIC PART No.	IRC PART No.	NOTES
R54	470KΩ	½	REB474M	BTS-470K	
R55	2.2Meg	½	REB225M	BTS-2.2Meg	
R56	82KΩ	½	REB823K		
R57	150KΩ	½	REB154K-A		
R58	82KΩ	½	REB823K		
R59	22KΩ	½	REB223K		
R60	3900Ω	1	REB392K		
R61	82KΩ	1	REB823K		
R62A	22KΩ				
B	8200Ω		+PC2435		
C	8200Ω				
R63	82KΩ	1	REB823K		
R64	1Meg	1	REB105K		
R65	12KΩ	1	REB123K-A		
R66	2.7Meg	1	REB275K		
R67	2.2Meg	1	REB225M		
R68	150KΩ	1	REB154K-A		
R69	1.5Meg	1	REB155K		
R70	560Ω	½	REB561M		
R71	1000Ω	2	RED102M		
R72	560Ω	1	REB561M		
R73	560Ω	1	REB561M		
R74	330KΩ	½	REB334K-A		
R75	820KΩ	½	REC824K-A		
R76	330KΩ 5%	1	REC334J-A		
R77	47KΩ	1	REC473K		
R78	180KΩ	½	REB184K-A		Note 1
R79	3900Ω	½	REB392K		
R80	150KΩ 5%	1	REC154J-A		
R81	82KΩ 5%	1	REC823J-A		
R82	8200Ω	½	REB822K		
R83	150KΩ	1	REB154K-A		Note 2
R84	100KΩ	1	REB104K		
R85	22KΩ	1	REB223M		
R86	180KΩ	1	REB184K-A		
R87	47Ω	½	REB470M		
R88	470KΩ	½	REB474M		
R89	27KΩ	2	RED273K		
R90	2700Ω	½	REB272K		
R91	100KΩ	1	REB104M		
R92	47KΩ	1	REB473M		
R93	3.3Ω	1	RE3303M	BW1-3.3	
R94	200Ω	20	RE3649	2D-200	
R95	100KΩ	1	REC104M	BTA-100	

Note 1. Some versions use a 160KΩ ½W resistor in this application. (Mfgr. Part No. REB154K-A)
Note 2. Some versions use a 180KΩ ½W resistor in this application. (Mfgr. Part No. REB184K-A)
* Items C48A, C48B, C49C, R84A, R85B, R85C are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	SEC 1	SEC 2	REPLACEMENT DATA: OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC ②1.4A	580VCT ·170ADC	6VAC ③3A	TR382-1 TR-3831 ③	P-9733 ①	P-2836 ① ③		P-8164 ①		
	SEC. 3	SEC. 4	SEC 5							
	6.3VAC ③8A									

① Drill new mounting holes.
② Taps 6.3V ②1.2A winding.
③ Alternate power transformer.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA: OLYMPIC PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T2	Horiz. Output Trans.	TR3855	PB41 ⑤	HVO-9 ⑤ ③	X080 ⑤	A-8255 ⑤ ②	A-8255 ⑤	FLY-24 ⑤	D-19 ⑤ ①
T3	Vert. Output Trans.	TR3690	Z1900 ②	A-3039 ②	226TH ②	V31R1 ②	A-8141 ② ③	26S54 ②	A-104X ② ④
T4A	Yoke-Horiz (19.5MH)	CL3847	DF605 ④	MDF-73 ④	222D ④	Y70F20. 43 ④	DY-11A ④	Y-10 ④	Y-122-1 ④
B	Vert.(95MH)								

① Drill new mounting hole(s).
② Use 18 ld frame ratio.
③ Connect blue lead to plate (pin 1 of V11). Connect red lead of transformer to yellow lead of yoke. Remove green lead of yoke from ground and connect it and green lead of transformer to junction C4, R6 and R11.
④ Connect horizontal damping network across terminals #3 and #7. Use original network if necessary.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	9	9	9	9	9	9	9	9
	6	5	5	5	4	5	5	5
	2 & 3	3	3	3	3	3	3	3
	1	1	1	1	1	1	1	1
Special Notes →					⑤			⑤

⑤ Jumper terminals #7 and #8.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	SEC.	REPLACEMENT DATA: OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	2.4kΩ	3.5Ω	TR2768-1	Z1101	A-3025	A-3332	26S58 ①	S-12X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: OLYMPIC PART No.	QUAM PART No.	NOTES
SP1	5"	PM	3.5Ω	SK1768-2	5A07	① Used in AH chassis.
	8"	PM	3.5Ω	SK386 ①	8A2I	

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	SEC.	REPLACEMENT DATA: OLYMPIC PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Match. Trans.							
L2	Ant. Match. Trans.	0Ω	0Ω					
L3	Ant. Coils, RF, Mixer Grid & Osc. Coils	0Ω						
L4	RF Coil	0Ω						
L5	Conv. Plate	.6Ω	.1Ω					
L6	1st. Video IF	0Ω	.2Ω	CL3688	17-1062		6249	
L7	21.75MC Trap	0Ω		CL3681		TV-150		
L8	2nd. Video IF	.3Ω	.3Ω	CL3689	17-1063	TV-151	6249	
L9	3rd. Video IF	.3Ω	.3Ω	CL3689	17-1063	TV-151	6249	
L10	4th. Video IF	.3Ω	.3Ω	CL3715	17-1063	TV-151	6249	
L11	Series Peaking Coil	2.5Ω		C-14535	18-3036	TV-180	6176	36 Microhenries
L12	Series Peaking Coil	3.6Ω		CL3401	19-3075 *	TV-181 *	6172 *	80 Microhenries, wound on 33kΩ resistor
L13	Shunt Peaking Coil	9Ω		CL3403	18-3300 ■	TV-190 ■	6155 ■	300 Microhenries, wound on 1Meg resistor
L14A	4.5MC Trap	8Ω						
B	Sound IF	2.1Ω		TR3386				
L15	Series Peaking Coil	10.5Ω		CL3398	18-3250 ▲	TV-188 ▲	6181 ▲	250 Microhenries, wound on 15kΩ resistor
L16	Shunt Peaking Coil	9Ω		CL3403	18-3300 ■	TV-190 ■	6155 ■	300 Microhenries, wound on 1Meg resistor
L17	RF Coil	4.2Ω		CL3401	19-3075 *	TV-181 *	6172 *	80 Microhenries, wound on 33kΩ resistor
L18	RF Choke	9Ω		CL3403	18-3300 ■	TV-190 ■	6155 ■	300 Microhenries, wound on 1Meg resistor
L19	Quadrature Coil	6.3Ω		CL3603	17-2495 •	TV-123 •	1681	
L20	Horiz. Osc.	23Ω	59Ω	TR2990	20-1602	TV-162	6183	Waveform winding -46Ω

* Parallel with 22kΩ resistor.
■ Parallel with 1Meg resistor.
▲ Parallel with 15kΩ resistor.
• Use one winding only.

FUSES

ITEM No	TYPE	RATING	REPLACEMENT DATA: OLYMPIC PART No. FUSE	OLYMPIC PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	3/8A 250V	FU3958	FH3852	312.375 (3AG 3/8A)	357001	AGC 3/8	4405

PARTS LIST AND DESCRIPTIONS (Continued)

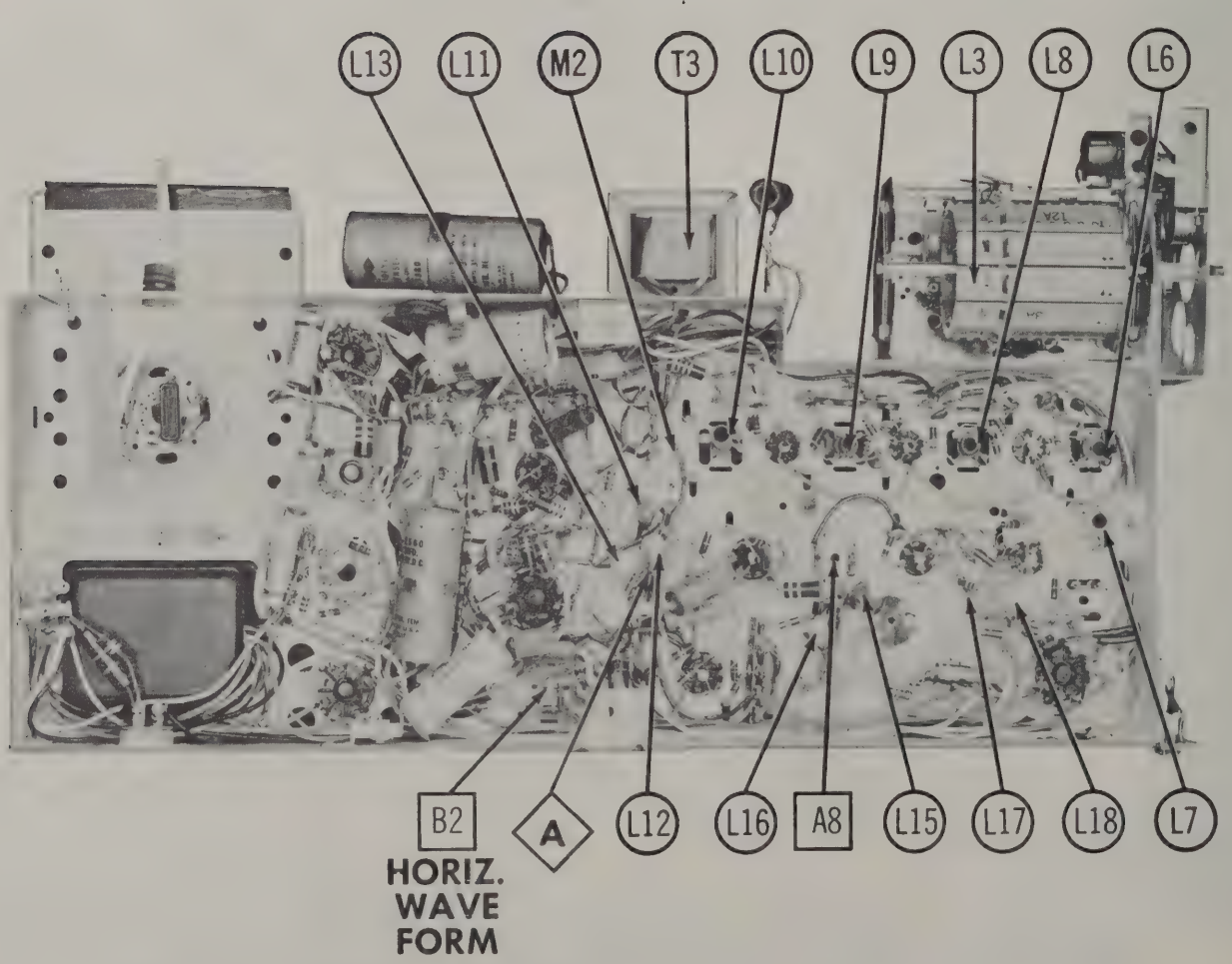
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		OLYMPIC PART No.	SYLVANIA PART No.	
M2	1N60*	1N60†	1N60	Video Det.

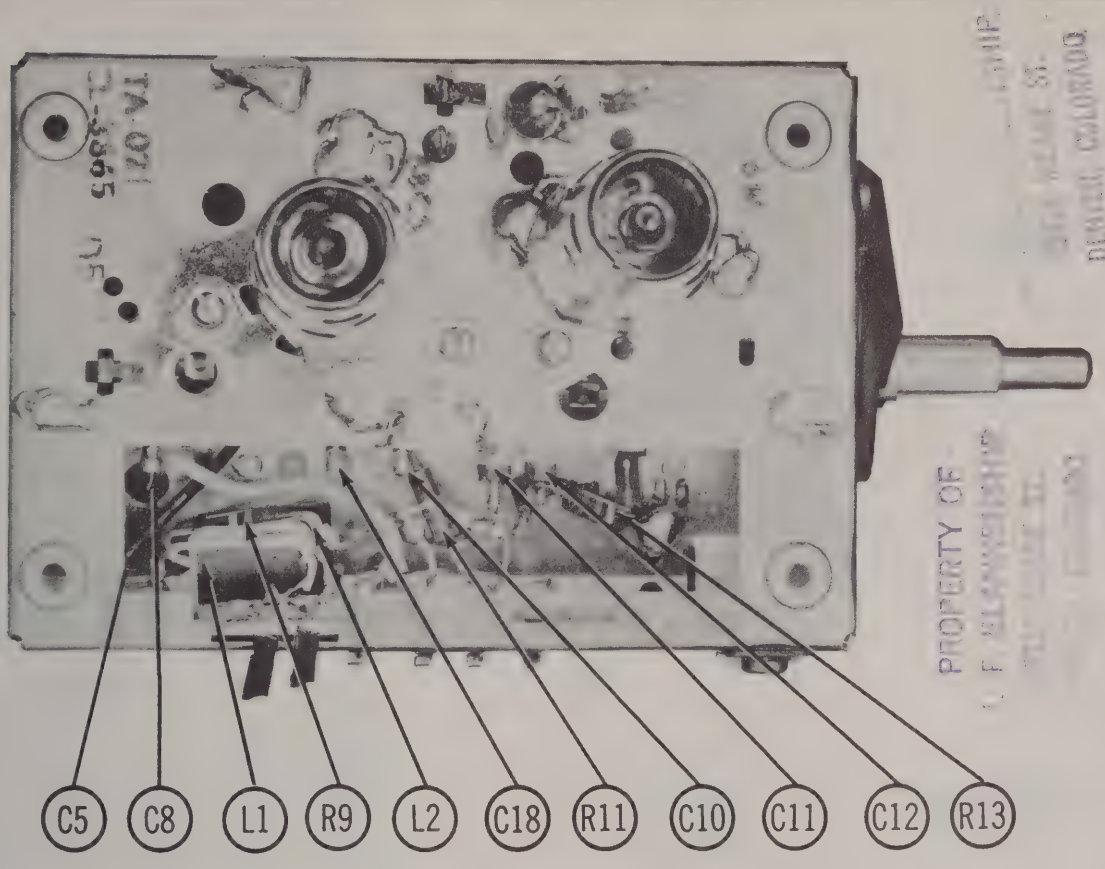
*Some versions may use 1N64 crystal diode in this application.
†Alternate Part No. 1N64.

MISCELLANEOUS

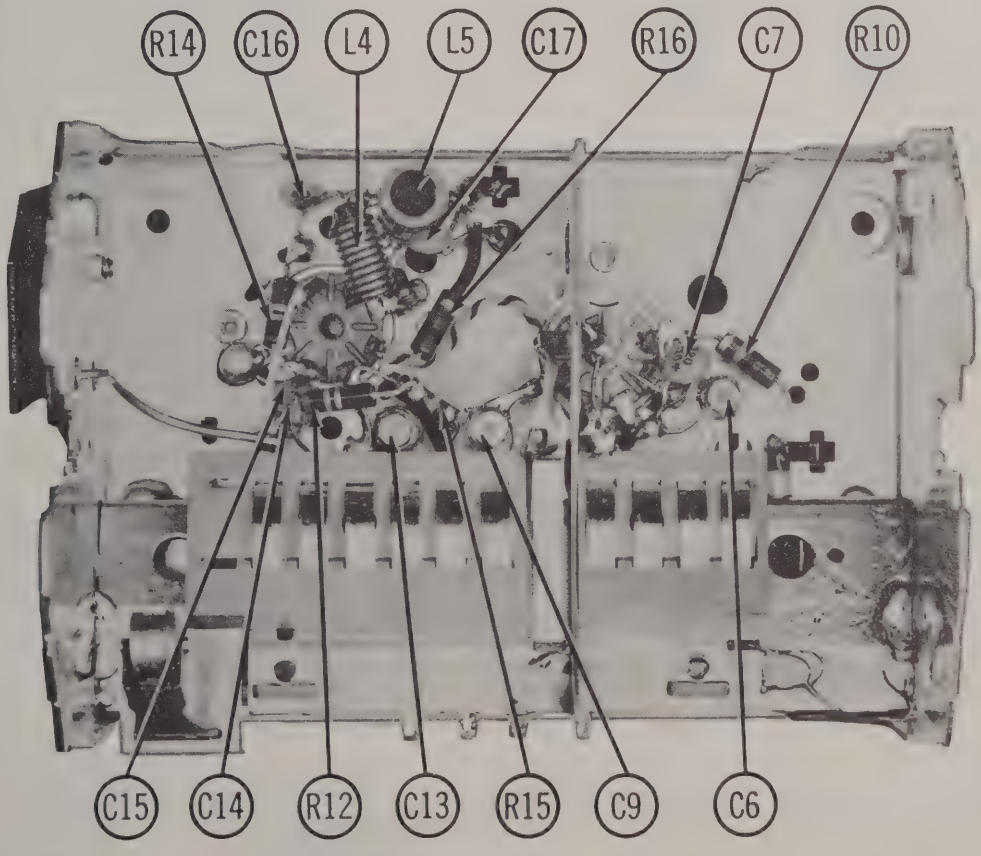
ITEM No.	PART NAME	OLYMPIC PART No.	NOTES
M3	Tuner	CL3865	VHF (Pentode)-"AF" Chassis, TA Series
	Tuner	CL3865-1	VHF (Pentode)-"AF" Chassis, H Series
	Tuner	CL3993	VHF (Cascode)-"AH" Chassis, TC Series
	Tuner	CL3929	VHF (Cascode)-"AL" Chassis, TC Series
M4	Centering Device	PP2763	
M5	Ion Trap	PP2623	
B3	Trimmer Cap.	CT3526	Horiz. Drive (110-580MMF)
	Safety Glass	PP3572-1	"AH" Chassis
	Safety Glass	PP3656	Models 21CF63, 21TF62
	Safety Glass	PP3656-1	Models 21CF61, 21TF60, 21CL81, 21TL80
	Mask	PP3972-1	"AH" Chassis
	Mask	PP3646-1	Models 21CF63, 21TF62
	Mask	PP3646-2	Models 21CF61, 21TF60, 21CL81, 21TL80



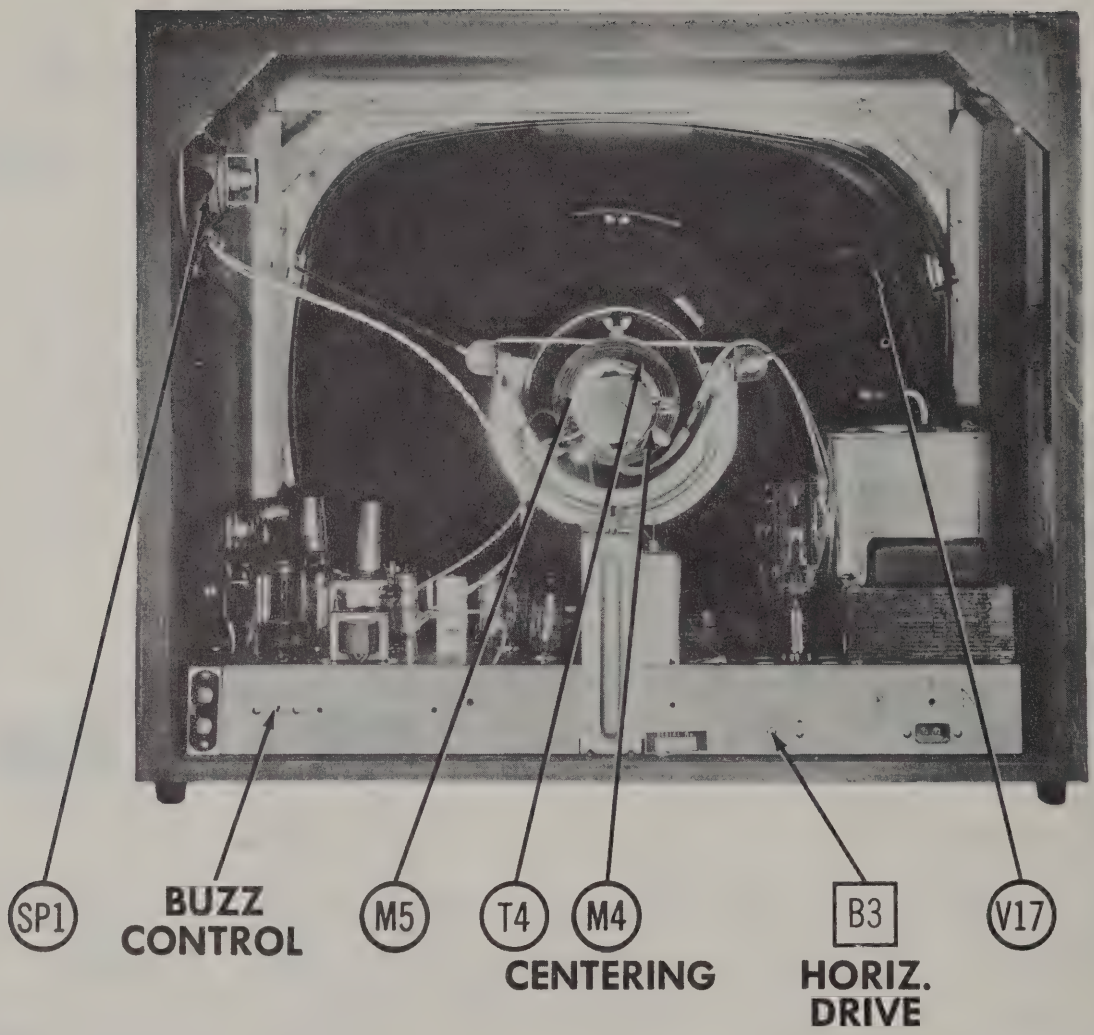
CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION



RF TUNER-TOP VIEW



RF TUNER-BOTTOM VIEW



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern. Connect a short jumper across terminals "C" and "D" of the horizontal oscillator transformer coil (L21).

Set the horizontal hold control fully clockwise. Adjust the horizontal frequency slug (B1) until the picture falls into sync. Remove the jumper from terminals "C" and "D" of L21. Connect the high side of vertical amplifier of scope thru a 5MMF to terminal "C" of L21. Low side to chassis.

Adjust the horizontal waveform slug (B2) for a waveform similar to Fig. 7 with broad and narrow peaks of equal height. If necessary, during adjustment of B2, keep picture in sync with horizontal hold control or B1.

Remove scope and retouch B1 for the following conditions.

1. At full clockwise position of the horizontal hold control a blanking bar or picture jitter should be evident.

2. At full counter clockwise position of horizontal hold control picture should lose sync with $4\frac{1}{2}$ to 5 diagonal bars sloping downward to the left. If picture remains in sync at either extreme setting of horizontal hold control, switch off channel and back again so that picture falls out of sync.

Adjust the horizontal drive trimmer (B3) counter clockwise as far as possible without the presence of vertical white lines or compression near the center of the picture. If neither of these indications appear, adjust B3 for a picture slightly wider than necessary to fill the picture mask horizontally.

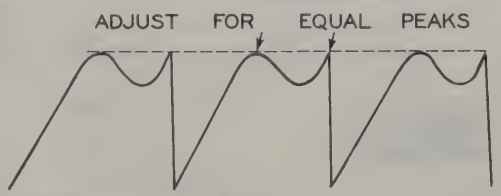
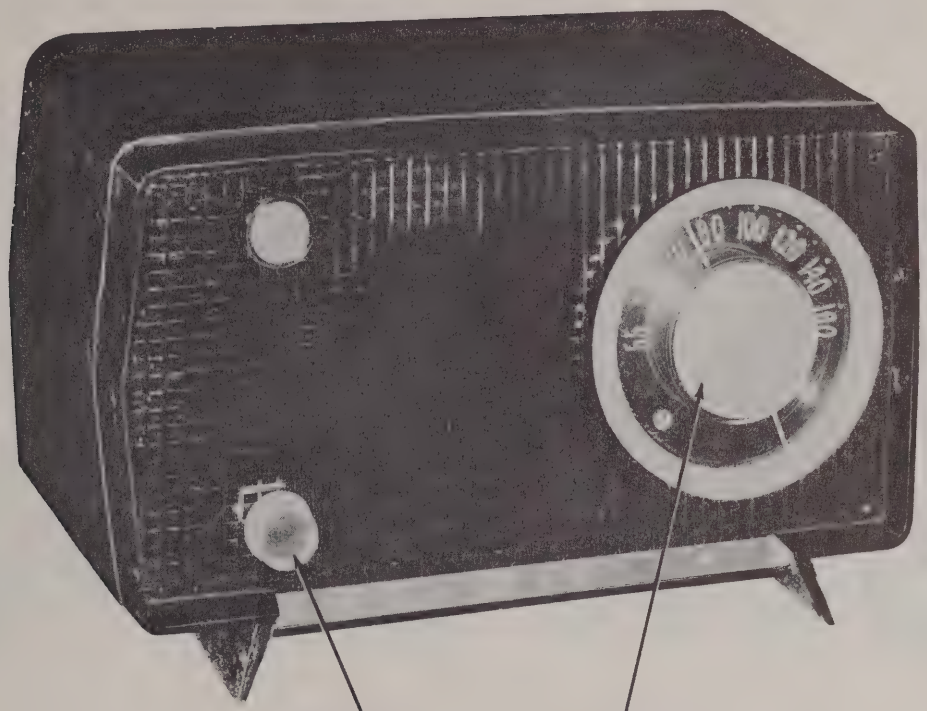


FIG. 7

RCA VICTOR MODELS
6-X-7A, B, C (Ch. RC-1128B)



RCA VICTOR MODELS
6-X-7A, B, C (Ch. RC-1128B)

TRADE NAME	RCA Victor Model 6-X-7A, B, C (Ch. RC-1128B)
MANUFACTURER	RCA Victor, Radio & "Victrola" Div., Radio Corp. of America, Camden 2, N. J.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types: 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC
RATING	.26 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 1 (grid) of 12BA6 (V2). Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open.	Across Voice Coil	A1, A2	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	High side to antenna stator lug. Low side to chassis.	"	"	"	A3, A4	"
3.		Loop (Radiated)	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
4.		"	1400KC	Tune to 1400KC signal	"	A6	"

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		RCA Victor PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det. -AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rect.	35W4	35W4	5BQ	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	RCA Victor PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	50	150	77427	TCD497	TDL-5030-150	MTD-301	
B	30	150					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	RCA Victor PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	.047	200	73558	DF-503		PT4147	
C3	68	500	39624	D6-680	801-680	UC-5468	
C4A	220						
B	5000						
C	5000		♦1408-02	♦PC-151	♦1408-02		
D	250						
E							
C5	.015	400	73797	D16-153		PT6115	
C6	.047	400	75071	DF-503		PT4147	
C7	.1	400	73551	DF-104		PT401	

♦ Items C4A, C4B, C4C, C4D, C4E, R7A, R7B and R7C are combined in one unit. When replacing items separately, items C4D and C4E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	RCA Victor PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	½	100229	AB-70	A47-1Meg-Z	Q13-137	U-53	Volume
B	Shaft		Not Req.	AK-3	FS-3	Not Req.	Not Req.	Attach to R1A.
C	Switch		Not Req.	KB-6	SWE-12	76-1	US-26T	Attach to R1A.

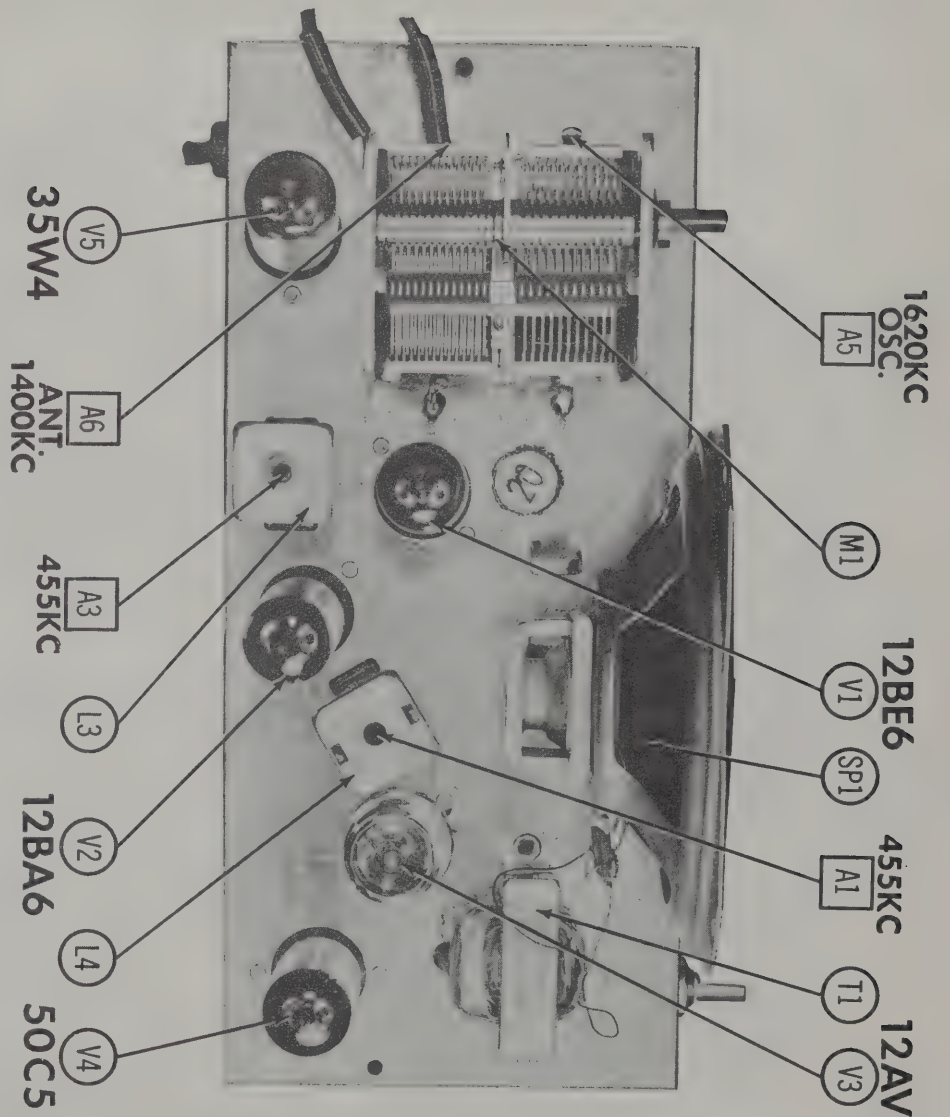
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	RCA Victor PART No.	IRC PART No.	
R2	22KΩ	½	502322	BTS-22K	
R3	100Ω	½	502110	BTS-100	
R4	100Ω	½	502110	BTS-100	
R5	3.3Meg	½	502533	BTS-3.3Meg	
R6	47KΩ	½	502347	BTS-47K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	RCA Victor PART No.	IRC PART No.	
R7A	6.8Meg	½	♦79058	BTS-6.8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	
R8	150Ω	½	502115	BTS-150	
R9	1200Ω	1	512212	BTA-1200	
R10	33Ω	½	502033	BTS-33	

♦ Items C4A, C4B, C4C, C4D, C4E, R7A, R7B, R7C are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	RCA Victor PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.7KΩ	3.5Ω	77993	Z1101	A-3025	A-3332	26S58 ①	S-12X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	RCA Victor PART No.	QUAM PART No.	
SP1	4"	PM	3.5Ω	79696	4A07	

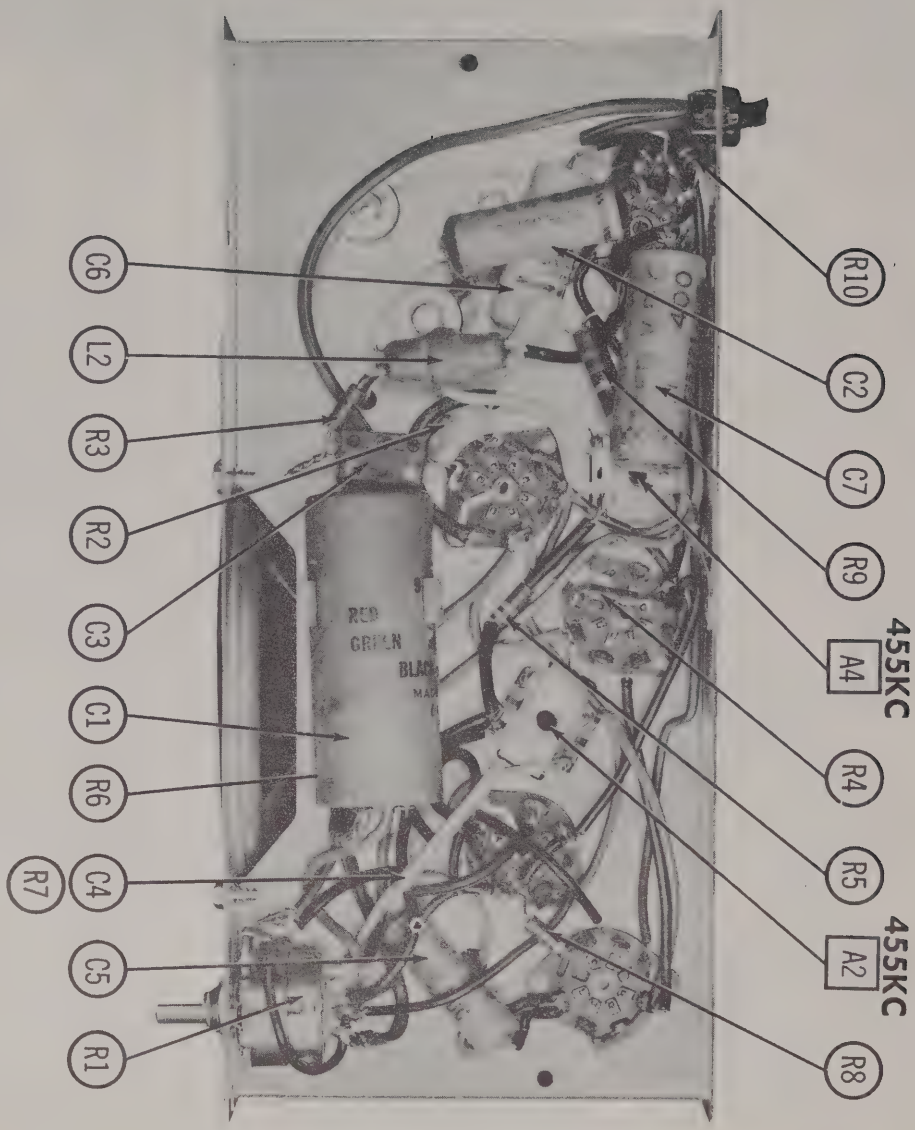
COILS (RF-IF)

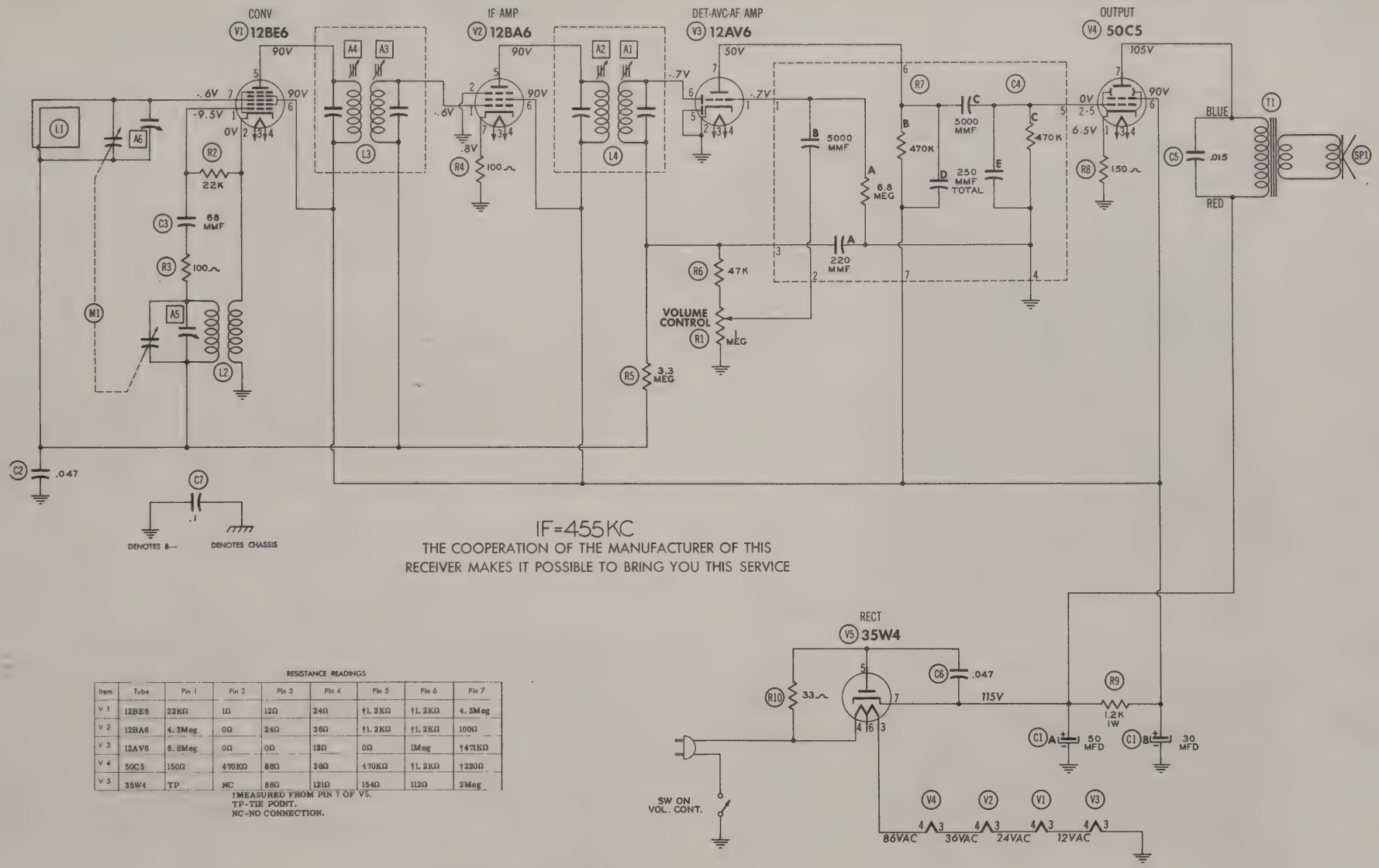
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	RCA Victor PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	2Ω		100228				
L2	Osc. Coil	1Ω	9Ω	100892	14-1074	BC-394	70-Osc.	
L3	Input IF	15Ω	15Ω	75486	16-6758	BC-352	12-C1	
L4	Output IF	45Ω	16Ω	77994	16-6758	BC-353	12-C2	

MISCELLANEOUS

ITEM No.	PART NAME	RCA Victor PART No.	NOTES
M1	Tuning Cap.	100224	2 Gang (25-435 MMF, 27-170MMF)
	Cabinet	Y2754	Model 6X7A
	Cabinet	Y2756	Model 6X7B
	Cabinet	Y2755	Model 6X7C
	Knob	100225	On-Off-Volume
	Knob	100227	Station Selector

CHASSIS—BOTTOM VIEW





IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	1Ω	12Ω	24Ω	†1.2KΩ	†1.2KΩ	4.3Meg
V 2	12BA6	4.3Meg	0Ω	24Ω	36Ω	†1.2KΩ	†1.2KΩ	100Ω
V 3	12AV6	6.8Meg	0Ω	0Ω	12Ω	0Ω	1Meg	†471KΩ
V 4	50C5	150Ω	470KΩ	86Ω	36Ω	470KΩ	†1.2KΩ	†230Ω
V 5	35W4	TP	NC	86Ω	121Ω	154Ω	112Ω	2Meg

†MEASURED FROM PIN 7 OF V5.
TP-TIE POINT.
NC-NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

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RAYTHEON MODELS C-2163B, M, C-2166B, M, C-2167B, M, M-1761E, M-1762A, C, G, K, M-2165B, M, M-2171E, M-2172C, G, M-2173A, C, G, K (Ch. 17T183, 21T24, 21T25, 21T26, 21T27, 21T193, C)

RAYTHEON MODEL M-1761E

TRADE NAME	RAYTHEON MODELS	CHASSIS
	M-1761E, M-1762A, M-1762C, M-1762G, M-1762K	17T183
	M-2165B, M-2165M	21T24
	C-2166B, C-2166M	21T25
	C-2167B, C-2167M	21T26
	C-2163B, C-2163M	21T27
	M-2171E, M-2172C, M-2172G	21T193
	M-2173A, M-2173C, M-2173G, M-2173K	21T193C
MANUFACTURER	Raytheon Manufacturing Co., Television & Radio Div., 5921 W. Dickens Ave., Chicago 39, Ill.	
TYPE SET	Television Receiver	
TUBES	Fifteen	
POWER SUPPLY	105-115 Volts AC-60 Cycle	RATING 1.34 Amp. @ 117 Volts AC
TUNING RANGE-	Channels 2 thru 13, Video IF 26.75MC, Sound IF 22.25MC (Intercarrier)	

INDEX

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RAYTHEON MODELS C-2163B, M, C-2166B, M, C-2167B, M, M-1761E, M-1762A, C, G, K, M-2165B, M, M-2171E, M-2172C, G, M-2173A, C, G, K (Ch. 17T183, 21T24, 21T25, 21T26, 21T27, 21T193, C)

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from top panel of cabinet.
2. Remove 5 metal screws. Remove rear cover.
3. Remove 4 metal screws at side and top of cabinet.
4. Slide side panel strip off runners to the rear of the cabinet.
5. Lift top half of cabinet straight up and off.

MODELS	CHASSIS
M-1761E, M-1762A, M-1762C, M-1762G, M-1762K	17T183
M-2165B, M-2165M	21T24
C-2166B, C-2166M	21T25
C-2167B, C-2167M	21T26
C-2163B, C-2163M	21T27
M-2171E, M-2172C, M-2172G	21T193
M-2173A, M-2173C, M-2173G M-2173K	21T193C

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet above and slightly to the left of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to the set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (B1) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the buzz control (R7) located on top of the chassis for maximum volume and minimum buzz.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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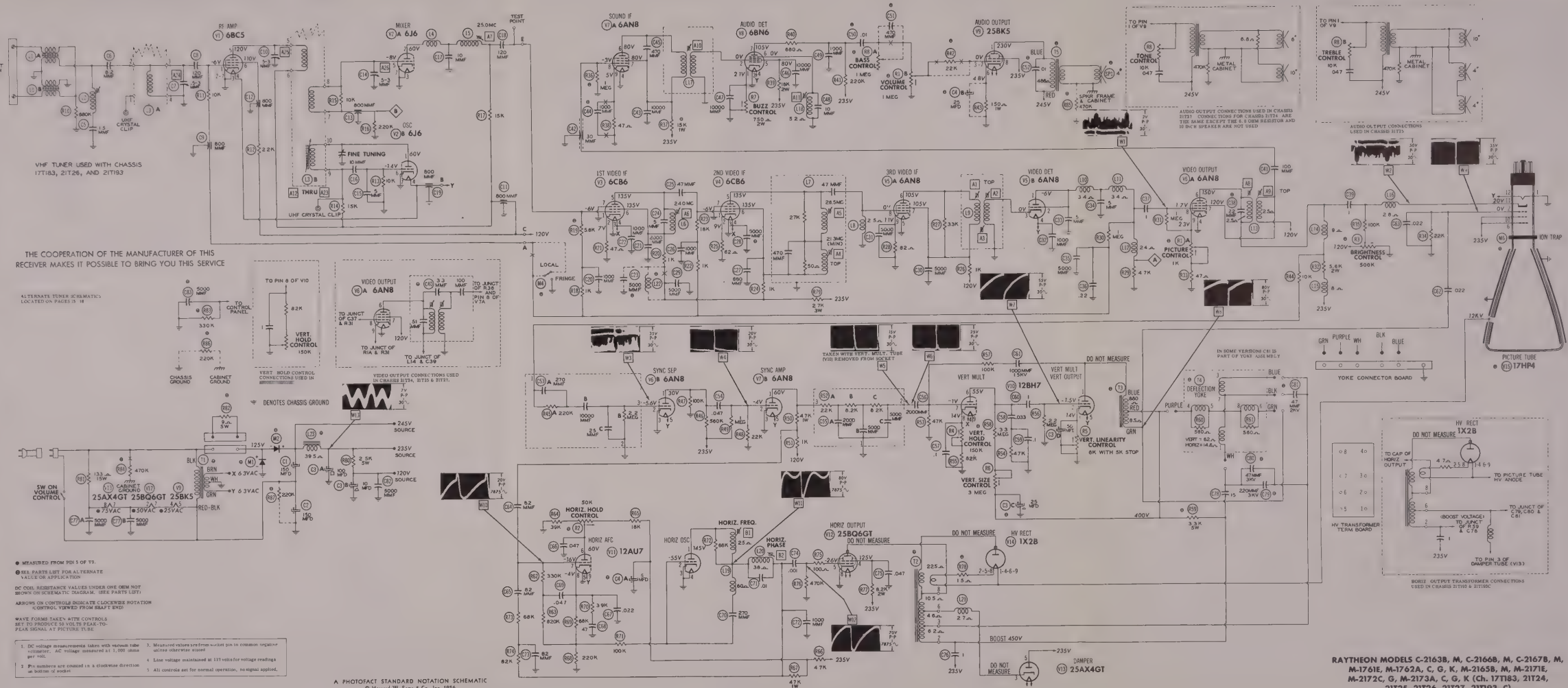
RF AMP V1 6BC5
MIXER V2A 6J6
OSC V2B 6J6
SOUND IF V7A 6AN8
AUDIO DET V8 6BN6
AUDIO OUTPUT V9 25BK5
1ST VIDEO IF V3 6CB6
2ND VIDEO IF V4 6CB6
3RD VIDEO IF V5A 6AN8
VIDEO DET V5B 6AN8
VIDEO OUTPUT V6A 6AN8
SYNC SEP V6B 6AN8
SYNC AMP V7B 6AN8
VERT MULT V10 12BH7
VERT MULT VERT OUTPUT
HORIZ HOLD CONTROL 30K
HORIZ AFC V11 12AU7
HORIZ OSC
HORIZ. FREQ.
HORIZ. PHASE
HORIZ OUTPUT V12 25BQ6GT
HV RECT V14 1X2B
DAMPER V13 25AX4GT
25AX4GT 25BQ6GT 25BK5
VOLUME CONTROL 1 MEG
BASS CONTROL 1 MEG
TREBLE CONTROL 10K
TONE CONTROL 10K
BUZZ CONTROL 750 2W
FINE TUNING
VERT. HOLD CONTROL 150K
VERT. SIZE CONTROL 3 MEG
VERT. LINEARITY CONTROL 6K WITH 5K STOP
PICTURE CONTROL 1K
BRIGHTNESS CONTROL 500K
VERT HOLD CONTROL 150K
VHF TUNER USED WITH CHASSIS 17T183, 21T26, AND 21T193
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
ALTERNATE TUNER SCHEMATICS LOCATED ON PAGES 15 18
DENOTES CHASSIS GROUND
SW ON VOLUME CONTROL
LOCAL
FRINGE
TAKEN WITH VERT. MULT. TUBE (V10) REMOVED FROM SOCKET
DO NOT MEASURE
IN SOME VERSIONS C81 IS PART OF YOKE ASSEMBLY
AUDIO OUTPUT CONNECTIONS USED IN CHASSIS 21T25 CONNECTIONS FOR CHASSIS 21T24 ARE THE SAME EXCEPT THE 8.5 OHM RESISTOR AND 10 INCH SPEAKER ARE NOT USED
VIDEO OUTPUT CONNECTIONS USED IN CHASSIS 21T24, 21T25 & 21T27.
TO CONTROL PANEL
TO PIN 8 OF V10
TO JUNCT OF R31 & R34
TO JUNCT OF R1A & R31
TO JUNCT OF L14 & C39
TO JUNCT OF R36 AND PIN 8 OF V7A
CHASSIS GROUND
CABINET GROUND
TO CAP OF HORIZ OUTPUT
TO PICTURE TUBE HV ANODE
(BOOST VOLTAGE) TO JUNCT OF R59 & C76
TO PIN 3 OF DAMPER TUBE (V13)
TO JUNCT OF C79, C80 & C81
BOOST 450V
400V
245V SOURCE
235V SOURCE
120V SOURCE
X 6.3VAC
Y 6.3VAC
75VAC
300VAC
425VAC
RED-BLK
YOKE CONNECTOR BOARD
PICTURE TUBE V15 17HP4
ION TRAP
HV TRANSFORMER TERM BOARD
HORIZ OUTPUT TRANSFORMER CONNECTIONS USED IN CHASSIS 21T193 & 21T196C
VERT = 62Ω HORIZ = 14Ω
MEASURED FROM PIN 5 OF V9.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction at bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated
4. Line voltage maintained at 117 volts for voltage readings
5. All controls set for normal operation, no signal applied.
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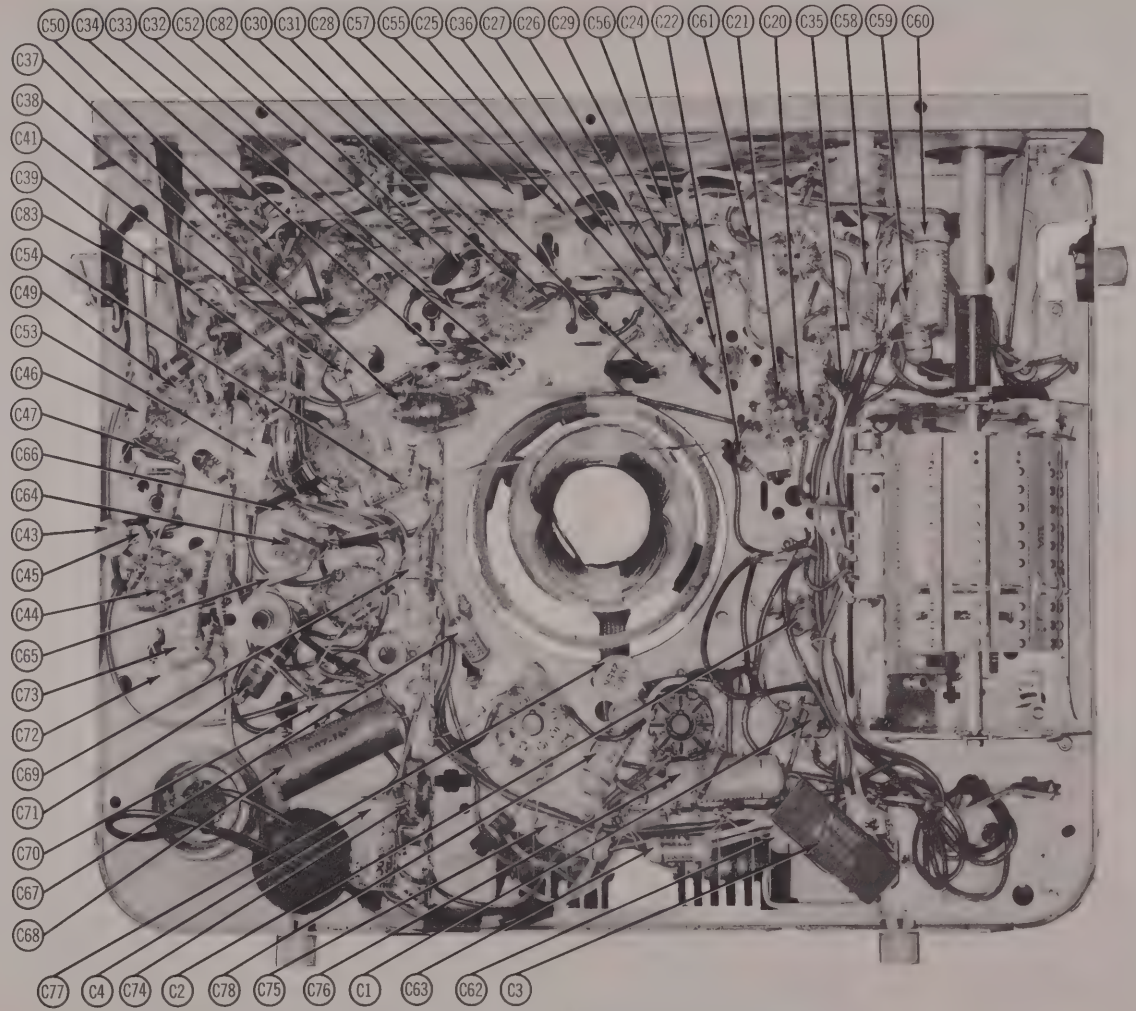
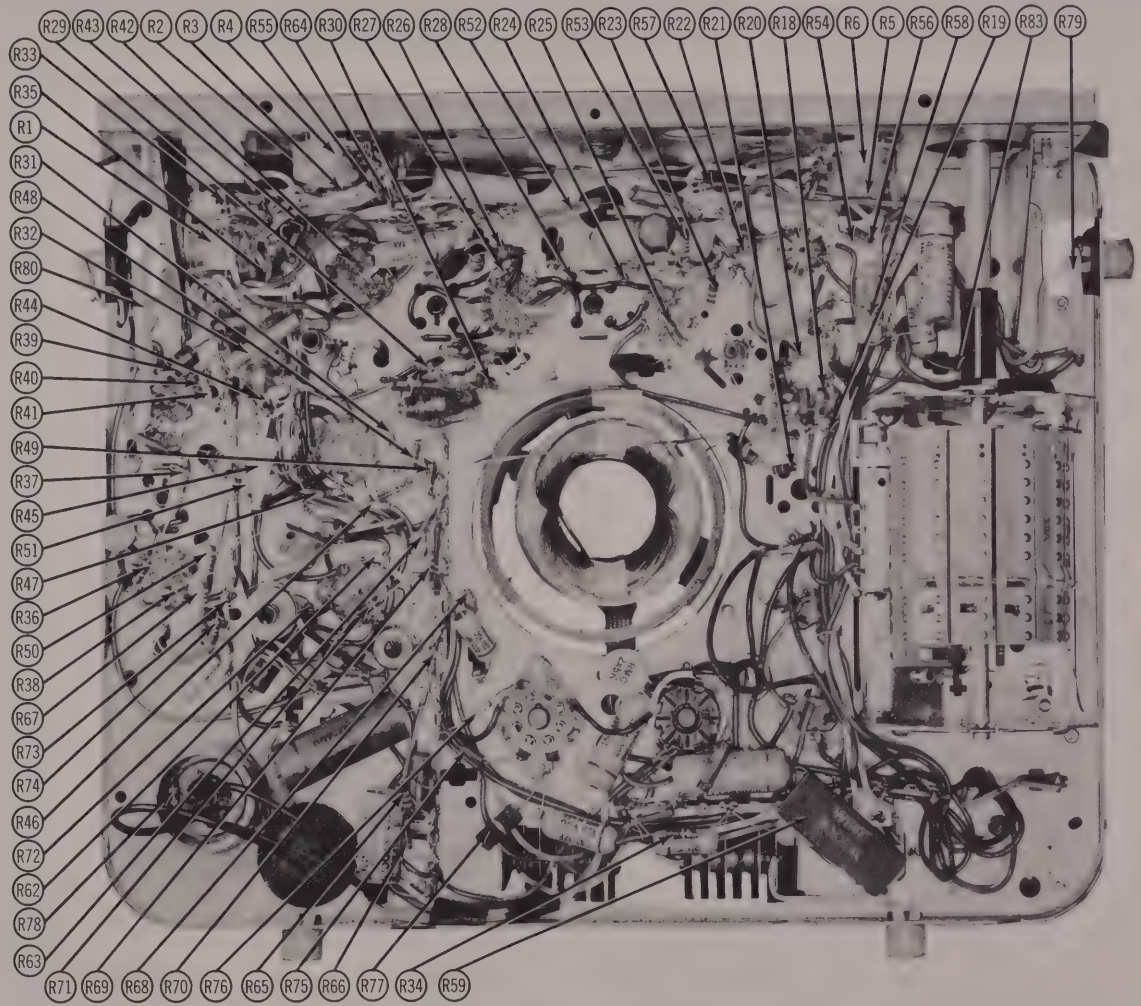
RAYTHEON MODELS C-2163B, M, C-2166B, M, C-2167B, M, M-1761E, M-1762A, C, G, K, M-2165B, M, M-2171E, M-2172C, G, M-2173A, C, G, K (Ch. 17T183, 21T24, 21T25, 21T26, 21T27, 21T193, C)

RAYTHEON MODELS C-2163B, M, C-2166B, M, C-2167B, M, M-1761E; M-1762A, C, G, K, M-2165B, M, M-2171E, M-2172C, G, M-2173A, C, G, K (Ch. 17T183, 21T24, 21T25, 21T26, 21T27, 21T193, C)



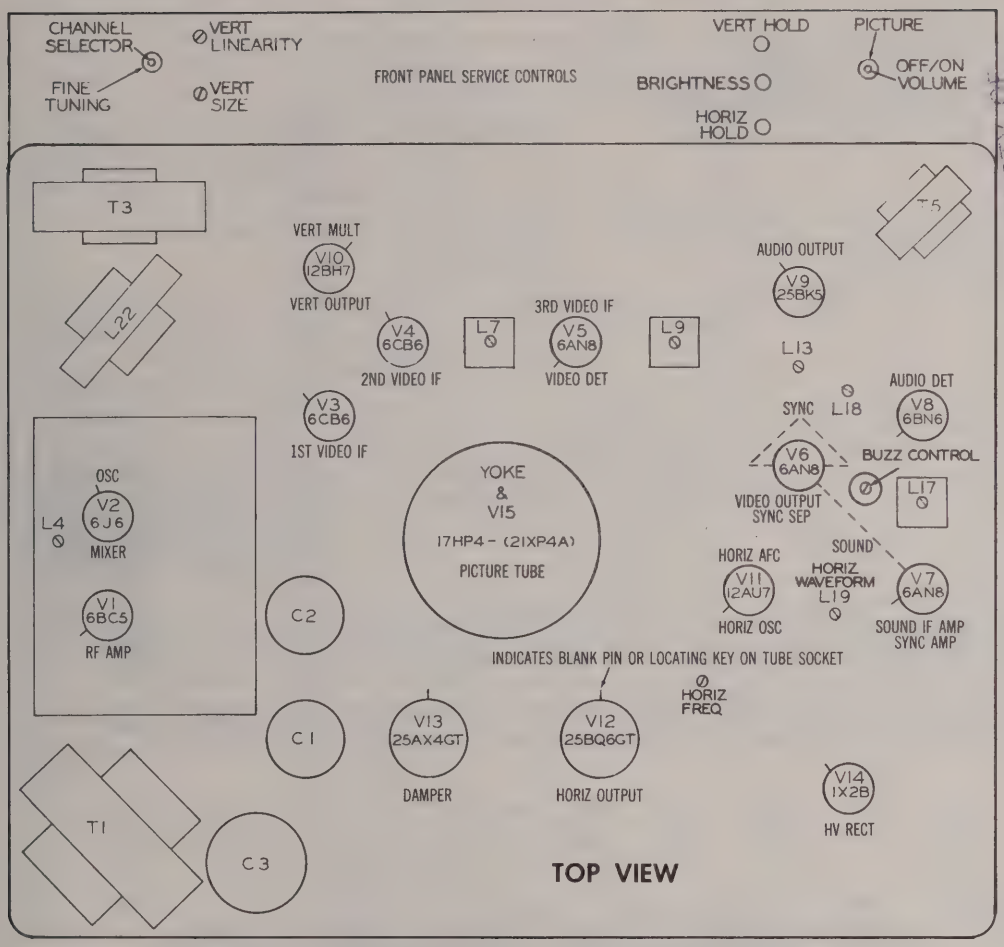
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

RAYTHEON MODELS C-21643B, M, C-21644B, M, C-21647B, M, M-17611, M-17612A, C, G, K, M-21645B, M, M-21711B, M-21712C, G, M, M-21724, C, G, K (Ch. 17711B, 21724, 21723, 21726, 21727, 21711B, C)

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

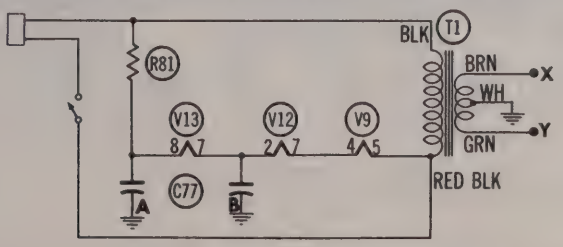
POWER SUPPLY FAILURE
No raster, no sound - Selenium Rectifiers (M1 & M2)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V15
Has pic, no sound - V7, V8, V9

SYNC FAILURE
No vert. sync - V7, V10
No horiz. sync - V7, V11
No vert. or horiz. sync - V6, V7

SWEEP FAILURE
No raster, has sound - V11, V12, V13, V14, V15
No vertical deflection - V10
Poor vert. linearity or foldover - V10
Poor horiz. linearity or foldover - V11, V12, V13
Narrow picture - V11, V12, V13, V14, M1, M2
Vert. off freq. - V7, V10
Horiz. off freq. - V7, V11

Note: Since this receiver employs tubes used in a series-parallel filament network, an open filament in any tube in series may cause the set to be inoperative. (See Circuit Below).



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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS - READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
The high voltage lead should be securely taped and kept away from chassis. Do not remove the horizontal oscillator tube (V11) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect a .001MFD across the vertical input terminals of oscilloscope.
Connect the synchronised sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use shielded short leads to prevent regeneration.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to pin 8 (grid) of 6AN8 (V5A). Low side to chassis.	25MC (10MC Swp)	23.0MC 26.3MC	Any	Vert. Amp. thru 10KΩ to point A. Low side to chassis.	A1, A2, A3	Connect a short jumper from pin 5 (plate) to pin 6 (screen) of 6CB6 (V4). Adjust for response curve similar to Fig. 1 with markers at 90%. A3 is a coupling rod and affects bandwidth. Remove short from pin 5 to pin 6 of V4.
2.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	Not used	21.3MC (Unmod.)	"	Use VTVM. DC probe to point A. Common to chassis.	A4	Adjust for MINIMUM deflection.
3.	"	"	"	26.5MC	"	"	A5	Adjust for maximum deflection. Attenuate generator output to maintain not more than 2 volts at VTVM. Repeat step 3.
4.	"	"	"	24.0MC	"	"	A6	Adjust for maximum deflection. Attenuate generator output to maintain not more than 2 volts at VTVM.
5.	"	"	"	25.0MC	"	"	A7	"
6.	"	"	25MC (10MC Swp)	21.3MC 23.8MC 26.25MC	"	Vert. Amp. thru 10KΩ to point A. Low side to chassis.		Check for response curve similar to Fig. 2. Rock A7 for flat-topped response. Increase sweep generator output and use high scope gain to view 22.25MC trap region. Adjust A4 so that 21.3MC occurs at peak of pop-up portion preceding trap notch. 22.25MC should fall in trap notch. If response obtained is not similar to Fig. 2., repeat step 1 thru 5.

SOUND IF ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket. Tune in a TV signal and adjust the fine tuning control until sound bars just appear in the picture. Adjust A8 fully counter clockwise, then clockwise until the horizontal scanning lines are smooth and continuous. Readjust the fine tuning control for clearest picture and best sound. Insert an attenuator in series with the antenna and the receiver antenna terminals so that the signal strength may be varied from weak to strong. If a suitable attenuator is not available, stray feed the signal to the receiver by placing the antenna lead-in near the antenna terminals.
Reduce the signal input to the receiver so that the signal falls below the limiting level of the 6BN6 (audio-detector) as evidenced by a "bias" in the sound. Adjust the secondary of the sound take-off transformer (A9), the sound IF transformer (A10), the quadrature coil (A11), and the buzz control (R7) for maximum sound and minimum buzz. If hiss disappears while adjusting, increase attenuation until hiss reappears.

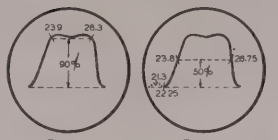


FIG.1

FIG.2

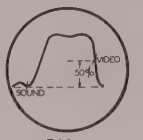


FIG.3

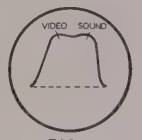


FIG.4

OSCILLATOR ALIGNMENT

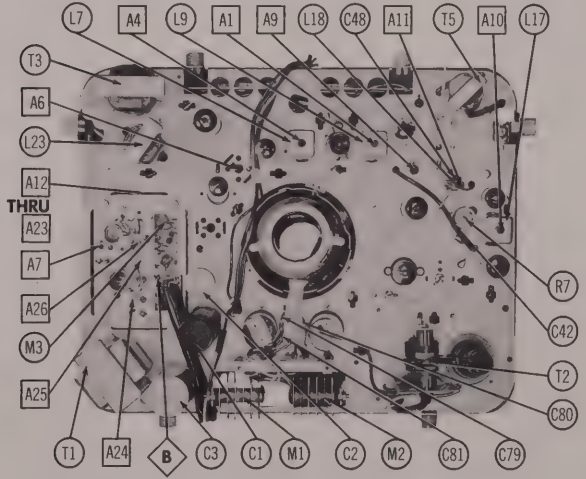
The channel oscillator adjustment screws are reached through a hole just above and slightly to the left of the fine tuning shaft. The correct oscillator adjustment screw is accessible thru this hole as the channel switch is turned to each channel. Connect the negative lead of a 1.5 volt bias battery to the tuner AGC. Connect the positive lead to chassis.
Connect the synchronised sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Two 120Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 10KΩ to point A. Low side to chassis.	A12	Adjust to place sound marker in trap notch as in Fig. 3. Use high scope gain and increase sweep generator output to view trap region. Video marker should fall at 50% on response curve.
			213MC (10MC Swp)	211.25MC 215.75MC	13		A13	
			207MC (10MC Swp)	205.25MC 209.75MC	12		A14	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A15	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A16	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A17	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A18	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A19	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A20	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A21	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A22	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A23	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A24	

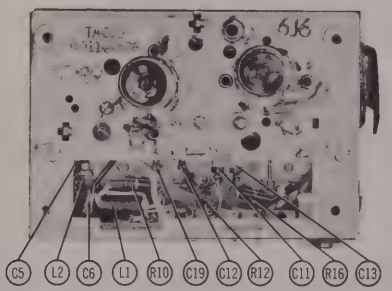
RF AND MIXER ALIGNMENT

Leave the bias battery connected as under "Oscillator Alignment".
Connect the synchronised sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

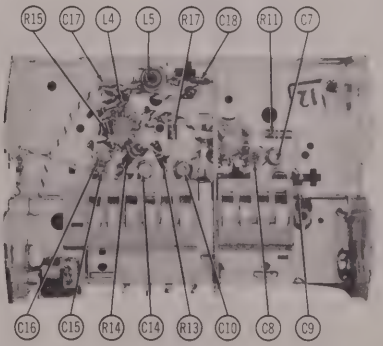
	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 10KΩ to point B. Low side to chassis.	A24, A25, A26	Adjust for response curve similar to Fig. 4 with markers above 90%.
9.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4	"		Check for response curve similar to Fig. 4. If markers fall below 70% on any channel, make slight compromise adjustments of A24, A25 and A26 with channel switch set to that channel. Recheck all other channels to see that they have not been seriously affected.
			213MC (10MC Swp)	211.25MC 215.75MC	13			
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			



CHASSIS TOP VIEW



RF TUNER TOP VIEW



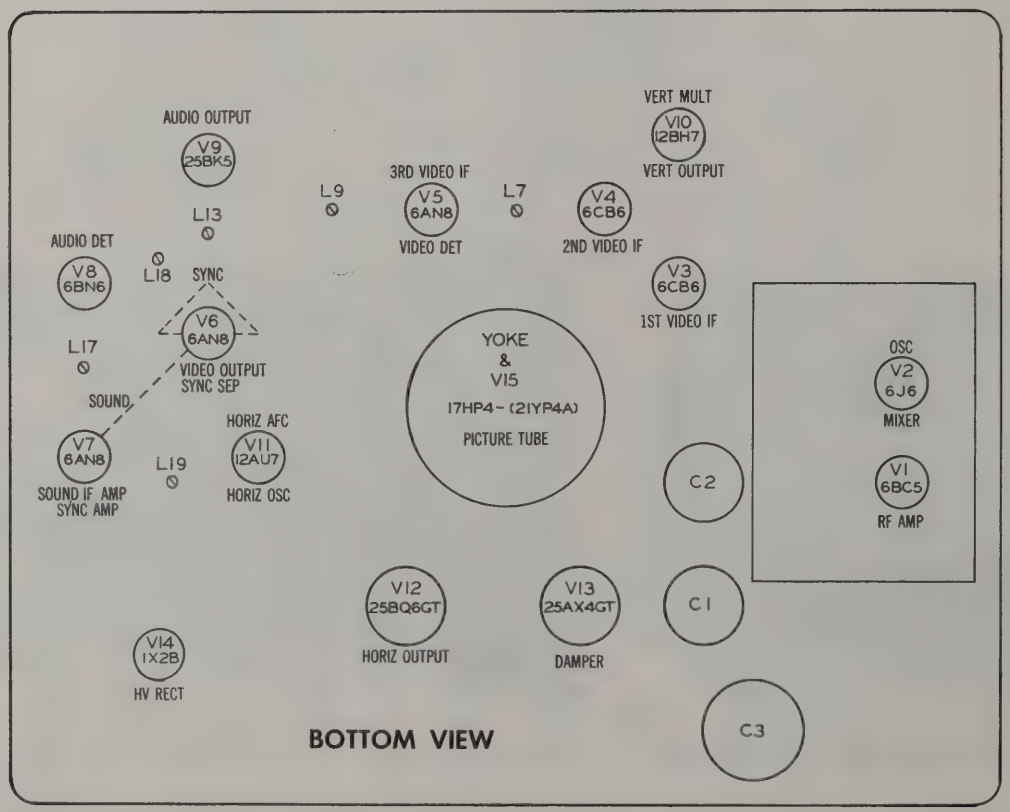
RF TUNER BOTTOM VIEW

RAYTHEON MODELS C-21638, M, C-21668, M, C-21678, M, M-1761E, M-1762A, C, G, K, M-2165B, M, M-2171E, M-2172C, G, M-2173A, C, G, K (Ch. 17T163, 21T24, 21T25, 21T26, 21T27, 21T193, C)

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BC5	1Meg	0Ω	0Ω	.1Ω	†2.5KΩ	†4.7KΩ	0Ω		
V 2	6J6	†18KΩ	†18KΩ	0Ω	.1Ω	220KΩ	10KΩ	0Ω		
V 3	6CB6	1Meg	47Ω	0Ω	.1Ω	†3.7KΩ	†3.7KΩ	0Ω		
V 4	6CB6	1Meg	62Ω	0Ω	.1Ω	†3.7KΩ	†3.7KΩ	0Ω		
V 5	6AN8	4.7KΩ	4.7KΩ	.2Ω	.1Ω	0Ω	†3.5KΩ	†3.5KΩ	2.5Ω	82Ω
V 6	6AN8	†150KΩ	2.2Meg	0Ω	0Ω	.1Ω	†5.6KΩ	†2.5KΩ	1Meg	120Ω
V 7	6AN8	†8.2KΩ	22KΩ	0Ω	0Ω	.1Ω	†15KΩ	†15KΩ	1Meg	47Ω
V 8	6BN6	260Ω	.3Ω	0Ω	.1Ω	†18KΩ	5.2Ω	†220KΩ		
V 9	25BK5	†500Ω	TP	400KΩ	■11Ω	■0Ω	150Ω	400KΩ	†40Ω	TP
V 10	12BH7	▲4.1KΩ	2.2Meg	850Ω	.1Ω	.1Ω	▲4Meg	47KΩ	135KΩ	2.6Ω
V 11	12AU7	†50KΩ	320KΩ	0Ω	0Ω	0Ω	†25KΩ	1.4Meg	300KΩ	.1Ω
V 12	25BQ6GT	NC	■21Ω	TP	†8.2KΩ	470KΩ	NC	■11Ω	0Ω	TOP CAP ▲13Ω
V 13	25AX4GT	TP	NC	700KΩ	NC	†40Ω	NC	■21Ω	■28Ω	
V 14	1X2B		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲238Ω
V 15	17HP4	0Ω	22KΩ	PIN 6 †40Ω	PIN 10 †40Ω	PIN 11 †200KΩ	PIN 12 .1Ω			

†MEASURED FROM OUTPUT OF M2.
▲MEASURED FROM PIN 3 OF V13.
■ MEASURED FROM PIN 5 OF V9.
TP-TIE POINT.
NC-NO CONNECTION.



TUBE PLACEMENT CHART

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: RAYTHEON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BC5	6BC5	7BD	
V2	Mixer-Osc.	6J6	6J6	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp. Video Detector	6AN8	6AN8	9DA	
V6	Video Output-Sync Separator	6AN8	6AN8	9DA	
V7	Sound IF Amp.-Sync Amplifier	6AN8	6AN8	9DA	
V8	Audio Detector	6BN6	6BN6	7DF	
V9	Audio Output	25BK5	25BK5	9BQ	
V10	Vert. Mult.-Vert. Output	12BH7	12BH7	9A	
V11	Horiz. AFC-Horiz. Osc.	12AU7	12AU7	9A	
V12	Horiz. Output	25BQ6GT	25BQ6GT	6AM	
V13	Damper	25AX4GT	25AX4GT	4CG	
V14	HV Rectifier	1X2B	1X2B	9Y	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: RAYTHEON PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V15	17HP4	17HP4/17RP4	17RP4/17HP4	17HP4/17RP4	17HP4/17RP4	12L	① Aluminized ② Silver screen
				17HP4B②		12L	
	21YP4A ①	21YP4A①	21YP4A ①	21YP4A②	21YP4A ①	12L	
		21YP4	21YP4	21YP4	21YP4	12L	
	21AVP4			21AVP4		12L	
	21AVP4A ①	21AVP4A ①		21AVP4A②	21AVP4A ①	12L	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: RAYTHEON PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1	150	150	8C-22464	FP117	TM-150-150	T-050	
C2	150	150	8C-22463	FP117	TM-150-150	T-050	
C3A	■100	300	8C-23689		TM-4128	T-537	
B	▲10	300				D-375	
C	▲25	450					Note 1
D	50	50					
C4A	5	300	8C-24193	TC60	TD-8-350	FM-3508	Note 2
B	25	25		TC26	TD-25-25	FM-0225	Note 2

Note 1. In chassis 21T193 and 21T193C, C3C is a single unit 20MFD ⓐ 550V (part #8C-25094) (3 Section C3 part #8C-22523).
Note 2. C4B is used only in chassis 21T24, 21T25 and 21T27 (single unit part #2M-24174).

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: RAYTHEON PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C5	1.5			TCZ-1R5	NP0A-1R5	ZT-5515	
C6	8.2		105S-25231				
C7	.5-3		105S-25232	829-3	3115-01-0R5	CT565A	
C8	120		100S-24336	DD-121	811-121	UC-5312	
C9	800		105S-25233				
C10	.5-3		105S-25232	829-3	3115-01-0R5	CT565A	
C11	800		105S-25233				
C12	800		105S-25233				
C13	800		105S-25233				
C14	.5-3		105S-25232	829-3	3115-01-0R5	CT565A	
C15	5		100S-24339				
C16	10		105S-25234	TCN-10	N750K-100	NT-541	
C17	10		100S-24338	TCZ-10	NP0K-100	ZT-541	
C18	120		100S-24336	DD-121	811-121	UC-5312	
C19	800		105S-25233				
C20	1000		8G-13201	D6-102	GP2L-102	UC-521	
C21	2000		8G-19522	D6-202	GP2-333-202	UC-522	
C22	1000		8G-13201	DD-102	801-001	DC-521	
C23	5000		8G-13962	DD-503	811-005	DC-525	Note 11
C24	5		8G-12166	TCZ-5	NP0A-050	ZT-555	
C25	47		8G-19731	DD-470	831-470	UC-5447	
C26	1000		8G-13201	DD-102	801-001	DC-521	
C27	680		8G-21105	D6-681	GP2K-681	UC-5368	
C28	5000		8G-13962	DD-502	811-005	DC-525	Note 3
C29	5000		8G-13962	DD-502	811-005	DC-525	
C30	5000		8G-13962	DD-502	811-005	DC-525	
C31	5000		8G-13962	DD-502	811-005	DC-525	
C32	1000		8G-13201	DD-102	801-001	DC-521	
C33	5		8G-12166	TCZ-5	NP0A-050	ZT-555	
C34	5		8G-12166	TCZ-5	NP0A-050	ZT-555	
C35	5000		8G-13962	DD-502	811-005	DC-525	
C36	.22	200	8K-23086			PT4022	
C37	.1	200	8K-23084	DF-104		PT401	
C38	22		8G-11892	TCN-22	N750K-220	NT-5422	Note 4
C39	.1	400	8K-23095	DF-104		PT401	
C40	3.3		8L-23551	TCZ-3R3	NP0A-3R3	ZT-5533	Note 11
C41	100		8G-12759	D6-101	GP1K-101	UC-531	
C42	30		14B-23772				
C43	10000		8G-20269	DD-103	811-01	DC-511	
C44	1000		8G-13201	DD-102	801-001	DC-521	Note 5
C45	470	500	8F2-121	D6-471	811-471	MCB245	
C46	10000		8G-20269	DD-103	811-01	DC-511	
C47	10000		8G-20269	DD-103	811-01	DC-511	
C48	10		8G-11789	TCZ-10	NP0K-100	ZT-541	
C49	1000		8G-13201	DD-102	801-001	DC-521	
C50	.01	400	8K-23091	D6-103	GP2-333-103	PT411	Note 6
C51	470	500	8F3-121	D6-471	GP2K-471	MC245	Note 12

RAYTHEON MODELS C-2163B, M, C-2166B, M, C-2167B, M, M-1761E, M-1762A, C, G, K, M-2165B, M, M-2171E, M-2172C, G, M-2173A, C, G, K (Ch. 17T183, 21T24, 21T25, 21T26, 21T27, 21T193, C)

CAPACITORS (cont)

ITEM No	RATING CAP	VOLT.	REPLACEMENT DATA RAYTHEON PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C52	.01	600	8K-23008	DM-103	GP3-333-103	PT6U	Note 7
C53A	270				GP2K-271	UC-5327	
B	10000		††TA-24315	††PC-363	‡U-01	DC-541	
C	35				GP1K-350	UC-5435	
C54	.047	300	8K-23083	DF-503		PT4147	
C55A	3000		▲47A-23276	▲PC-100	▲1405-01	DC-522	
B	5000					DC-525	
C	3000					DC-522	
C56	3000		8G-19523	DM-102	GP3-333-302	DC-522	
C57	.1	300	8K-23084	DF-104		PT401	
C58	.033	400	8K-23816	DF-303		PT6133	
C59	.1	300	8K-23084	DF-104		PT4147	
C60	.1	400	8K-23095	DF-104		PT401	
C61	1000	1500	8G-24691	DD30-102	1K5KV-102	MC6310	
C62	.022	600	8K-23085	DF-303	617-03	PT6123	
C63	.022	300	8K-23082	DF-303	817-03	PT4123	
C64	91	500	GP3-112	DD-520	501-910		
C65	82	500	GP3-112	DD-820	501-820		
C66	.047	400	8K-23094	DF-503		PT4147	
C67	.033	300	8K-23082	DF-303	817-03	PT4123	
C68	.47	200	8K-23087	DF-503		PT4047	
C69	.047	300	8K-23083	DF-503		PT4147	
C70	270	500	GP3-235	TC2-270	NPO-235-271	MC6241	
C71	.01	600	8M-24439				
C72	1000	500	GP7-125			MC8255	
C73	82	500	GP3-112	DD-820	501-820		
C74	.001	600	8K-23099	DD-102	GP2L-103	PT621	
C75	.047	400	8K-23094	DF-503		PT4147	
C76	.1	600	8K-23106	DF-104		PT601	
C77A	5000		8G-23790	DD3-502	‡1L-005	DC-525	
B	5000				‡1L-005	DC-525	
C78	.15	300	8K-24065			PT4015	
C79	220	3000	8G-23953	DD30-221	3KV-221	DC30322	Note 8
C80	47	3000	8G-24038	DD30-470	3KV-470	DC30447	Note 8
C81	47	3000	8G-23845	DD30-470	3KV-470	DC30447	Note 9
C82	5000		8G-13962	DD-502	5L1-005	DC-525	
C83	5000		8G-13962	DD-502	5L1-005	DC-525	Note 10

Note 3. Some versions use 1000MMF in this application (part #8G-13962).
Note 4. Chassis 21T24, 21T25 and 21T27 use 51MMF in this application.
Note 5. Not used in chassis 21T24, 21T25 and 21T27.
Note 6. Chassis 21T25 use .047MFD in this application (part #8K-23094).
Note 7. Chassis 21T24, 21T25 and 21T27 use .047MFD in this application (part #8K-23105).
Note 8. Chassis 21T183 and 21T193C use 22MMF ⑤ 3000V in this application (part #8G-24718).
Note 9. Chassis 21T193 and 21T193C use 68MMF in this application (part #8G-24702).
Note 10. Chassis 21T24, 21T25 and 21T27 use .01MFD in this application (part #8K-23098).
Note 11. Used only in chassis 21T24, 21T25 and 21T27.
Note 12 Used only in chassis 21T25.
† Items C58A, C58B, C58C, R45A and R45B are combined in one unit.
♦ Items C59A, C59B, C59C, R52A, R52B and R52C are combined in one unit.

CONTROLS

ITEM No	RATING RESISTANCE	TAPER	REPLACEMENT DATA RAYTHEON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1000Ω		10A-24698	F1-5	RTV-527	QJ-794♦	UF13R	Picture (Panel)
B	1Meg			R2-52			UR16A	* Volume (Rear) Attach to R1A
C	Switch			KB-1			UR-16	Attach to R1B
R1A	1000Ω		10A-23714	F1-4	RTV-496	QJ-734A	UF13L	Picture (Panel) (See Note 1)
B	1Meg			R2-52			UR16A	† Volume (Rear) Attach to R1A
C	Switch			KB-1			UR-16	Attach to R1B
R2A	50KΩ	‡	10B-23894	AB-5L	A47-50K-S	QJ1-123	TA54L	Horizontal Hold
B	Shaft		Not Req.	AK-4	KS6-3	Not Req.	Not Req.	Attach to R2A
R3	500KΩ		10B-24280		A47-500K-S	QJ1-133	U-50	Horizontal Hold (See Note 6)
R3A	500KΩ		13B-23895	AB-5B	A47-500K-S	QJ1-132	TA55L	Brightness
B	Shaft		Not Req.	AK-4	KS6-3	Not Req.	Not Req.	Attach to R3A
R3A	500KΩ	‡	10B-24259	B-5B	A47-500K-S	QJ1-133	U-50	Brightness (See Note 4)
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A.
R4A	150KΩ	‡	10B-23693-1	AB-4B	A47-150K-S	QJ1-128	TA24L	Vertical Hold
B	Shaft		Not Req.	AK-4	KS6-3	Not Req.	Not Req.	Attach to R4A.
R4	150KΩ		10B-24518-4					Vertical Hold (See Note 5)
R5A	4000Ω		10B-23407	AB -10++	A47-5000Ω++	QJ1-114++	TA53L++	Vertical Linearity (Stop at 5000Ω)
B	Shaft		Not Req.	AK-1	FKS-1/4	RQ	Not Req.	Attach to R5A.
R6A	3Meg	‡	10B-23898	AB-6A	A47-3Meg-S	QJ1-140	TA36L	Vertical Size
B	Shaft		Not Req.	AK-1	FKS-1/4	RQ	Not Req.	Attach to R6A
R7	750Ω	‡	10B-23857		3R-750		Buzz (Wire Wound)	
R8A	1Meg		10B-24164	F1-55		QJ-537††	UF15L	Bass (Panel) (See Note 2)
B	1MΩ		Not Req.	R2-52			UR34L	Treble (Rear) Attach to R8A
R8	10KΩ		10B-24261	B-5B		QJ1-116		Tone (See Note 3)
R9A	150KΩ		10B-24142-1	F1-52				Vertical Hold (See Note 1)
B	50KΩ			R2-55				Horizontal Hold

♦CONCENTRIKIT EQUIVALENT; K-5 KIT, BASE ELEMENTS AND SHAFTS; B1T-108, P1-020 (Rear)
B12-137, P1-103 (Rear)
76-1 Switch

▲Universal Replacement (Mallory Exact Duplicate Part No. UE65S).
▲CONCENTRIKIT; K-8 KIT, BASE ELEMENTS AND SHAFTS; B1T-108, P1T-102 (Panel)
B12-137, R2-115 (Rear)
76-1 Switch

‡Universal Replacement (Mallory Exact Duplicate Part No. UE65S).
♦♦Connect a 1000Ω resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end, terminals down.
††CONCENTRIKIT EQUIVALENT; K-2 KIT, BASE ELEMENTS AND SHAFTS; B1J-137, P7-108 (Panel)
B1J-116, R2-124 (Rear)

Note 1. Used in chassis 21T24, 21T25, and 21T27 only.
Note 2. Used in chassis 21T25 only.
Note 3. Used in chassis 21T24 and 21T27 only.
Note 4. Used in chassis 21T24, 21T25, 21T27 and 21T26.
Note 5. Used in chassis 21T26 only.

RESISTORS

ITEM No	RATING OHMS	WATT	REPLACEMENT DATA RAYTHEON PART No.	IRC PART No.	NOTES
R10	460KΩ	‡	9B1-86	BTS-460K	
R11	10KΩ	‡	9B1-74		
R12	2200Ω	‡	9B1-66	BTS-2200	
R13	10KΩ	‡	9B1-74		
R14	15KΩ	‡	9B1-76		
R15	10KΩ	‡	9B1-74		
R16	220KΩ	‡	9B1-27		
R17	15KΩ	‡	9B1-76		
R18	1000Ω	‡	9B1-62	BTS-1000	
R19	5600Ω	‡	9B1-70		Note 1
R20	1000Ω	‡	9B1-62	BTS-1000	
R21	47Ω	‡	9B1-46	BTS-47	
R22	1000Ω	‡	9B1-62	BTS-1000	
R23	18KΩ	‡	9B1-77		
R24	1000Ω	‡	9B1-62	BTS-1000	
R25	620Ω 5%	‡	9B1-120	BTS-62 5%	
R26	1000Ω	‡	9B1-62	BTS-1000	
R27	150KΩ	‡	9B1-80		
R28	82Ω	‡	9B1-49	BTS-82	
R29	47000Ω	‡	9B1-79		
R30	1MΩ	‡	9B1-98	BTS-1Meg	
R31	1Meg	‡	9B1-98	BTS-1Meg	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	WATT	REPLACEMENT DATA RAYTHEON PART No.	IRC PART No.	NOTES
R32	5600Ω	2	9B4-71	BTB-5600	
R33	47Ω	‡	9B1-46	BTS-47	
R34	220Ω	‡	9B1-78		
R35	100KΩ	‡	9B1-86		
R36	1Meg	‡	9B1-98	BTS-1Meg	Note 3
R37	15KΩ	‡	9B3-75	BTA-15K	Note 3, 4
R38	47Ω	‡	9B1-46	BTS-47	
R39	18KΩ	‡	9B1-77	BTS-18K	
R40	680Ω	‡	9B1-50	BTS-680	
R41	220KΩ	‡	9B1-90	BTS-220K	
R42	22KΩ	‡	9B1-78	BTS-22K	Note 5
R43	150Ω	‡	9B3-53	BTA-150	
R44	10KΩ	‡	9B1-74		
R45A	230KΩ	‡	†17A-24215		
B	2.2Meg	‡			
R46	560KΩ	‡	9B1-95	BTS-560K	
R47	100KΩ	‡	9B1-86	BTS-100K	
R48	22KΩ	‡	9B1-78		
R49	1Meg	‡	9B1-98		
R50	4700Ω	‡	9B3-70	BTA-4700	
R51	1000Ω	‡	9B1-62	BTS-1000	
R52A	22KΩ	‡			
B	8200Ω	‡	♦17A-23276		
C	82000Ω	‡			
R53	47KΩ	‡	9B1-82		
R54	4700Ω	‡	9B1-70	BTS-4700	
R55	82KΩ	‡	9B1-85	BTS-82K	
R56	2.2Meg	‡	9B1-102		
R57	100KΩ	‡	9B1-86		
R58	3.3Meg	‡	9B1-104		
R59	9300Ω	5	9C12-105	PW7-3500	Note 8
R60	560Ω	‡	9B1-59		
R61	560Ω	‡	9B1-59		
R62	330KΩ	‡	9B1-92	BTS-330K	
R63	820KΩ	‡	9B1-97	BTS-820K	
R64	39KΩ	‡	9B1-81	BTS-39K	
R65	18KΩ	‡	9B1-77		
R66	4700Ω	‡	9B1-17		
R67	47KΩ	‡	9B3-82	BTA-47K	
R68	220KΩ	‡	9B1-90	BTS-220K	
R69	68KΩ	‡	9B1-84		
R70	3900Ω	‡	9B1-89	BTS-3900	
R71	100KΩ	‡	9B1-86		
R72	68KΩ	‡	9B1-84		
R73	68KΩ	‡	9B1-84		
R74	82KΩ	‡	9B1-85		
R75	100Ω	‡	9B1-50		
R76	470KΩ	‡	9B1-94	BTS-470K	
R77	8200Ω	3	9B4-73		
R78	1.5Ω	3	9C1-1066	BW1-1.5	Note 7
R79	2700Ω	5	9C12-104		
R80	2500Ω	5	9C-24033	PW7-2500	
R81	15Ω	15	9C-23672		
R82	9Ω	5	4GM-23301		Note 8
R83	330KΩ	‡	9B1-92	BTS-330K	
R84	470KΩ	‡	9B1-94	BTS-470K	Note 5
R85	470KΩ	‡	9B1-94	BTS-470K	Note 9
R86	220KΩ	‡	9B1-74	BTS-220K	Note 10
R87	220KΩ	‡	9B1-74	BTS-220K	Note 11

Note 1. Some versions use a 12KΩ ½W resistor in this application.
Note 2. A 10KΩ ½W resistor is used in chassis 21T24, 21T27 in this application.
Note 3. Some versions use a 12KΩ 1W resistor in this application.
Note 4. A 33KΩ 1W resistor is used in chassis 21T24, 21T27, 21T25 in this application.
Note 5. Not used in some versions.
Note 6. A 1500Ω 5W (WW) resistor is used in chassis 21T193, 21T193C in this application.
Note 7. A 4.7Ω 5W resistor is used in chassis 21T193, 21T193C in this application.
Note 8. A 5.8Ω 5W fuse resistor is used in chassis 21T193, 21T193C in this application.
Note 9. Used in chassis 21T193, 21T193C, 21T24, 21T25, 21T27 only.
Note 10. Used in chassis 21T24, 21T25 only.
Note 11. Used in chassis 21T25 only.
† Items C53A, C53B, C53C, R45A, R45B are combined in one unit.
♦ Items C58A, C58B, C58C, R52A, R52B, R52C are combined in one unit.

TRANSFORMER (FILAMENT)

ITEM No.	RATING PRI.	SEC. 1	SEC. 2	REPLACEMENT DATA RAYTHEON PART No.	Haliadoran PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	115VAC			12D23699-3	F5526 ③	P-3959		P-8130	30F67	
	4.30A			12D23699 ⊥						

① Alternate filament transformer.
② Drill one new mounting hole.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	RAYTHEON PART No.	Haliadoran PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Horiz. Output Trans.	12E-23589 ①			X18S *	*		FLY-80*	
T3	Vert. Output Trans.	12E-24682 ③							
		12E-23726-1 ③	21H04	A-3037	122T1	V313	A-8123	26S62	A-102X
		12C-19048-2 ⑤	21H04 ⑤	A-3037 ⑤	122T1 ⑤	V313 ⑤	A-8123 ⑤	26S53 ⑤	A-102X ⑤
T4A	Yoke-Horiz. (8.5MH)	12E-23726 ④	21H04	A-3037	122T1	V313	A-8123	26S52 ④	A-102X
		201-24748 ⑤	DF501 ⑤	MDF-72 ⑤	20MD1 ⑤	Y70F08 ⑤	DY-8A ⑤	Y-5 ⑤	Y-12-1 ⑤
B	Vert. (42MH)	201-24532 ⑤	DF504 ⑤	MDF-75 ⑤		Y70F25 ⑤	DY-16A ⑤	Y-12 ⑤	Y-19-1 ⑤
	Horiz. (25MH) ⑥	201-24056 ⑦	DF501 ⑤	MDF-76 ⑤	20MD1 ⑤	Y70F08 ⑤	DY-8A ⑤	Y-5 ⑤	Y-12-1 ⑤
	Vert. (42MH)	201-24583 ⑤	DF501 ⑤	MDF-70 ⑤	20MD1 ⑤	Y70F08 ⑤	DY-8A ⑤	Y-5 ⑤	Y-12-1 ⑤
		201-24583-1 ⑤							

1 Used in chassis 17T183, 21T27, 21T24, & 21T25.
2 Used in chassis 21T193 & 21T193C
3 Used in chassis 17T183.
4 Used in chassis 21T27, 21T24, & 21T25.
5 Drill new mounting hole(s).
6 Used in chassis 17T183 and includes R60 & R61.
7 Used in chassis 21T27.
8 Used in chassis 21T24 & 21T25.
9 Use original rear cover & centering device.
⑩ Use original horizontal yoke damping network.
⑪ Use original yoke damping network.
⑫ Inductance for all but 201-24632 yoke.
⑬ Inductance for 201-24632 yoke only.
⑭ Used in chassis 21T25.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Haliadoran Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
8				8		8	
6				6		6	
3				3		3	
2				2		2	

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI.	SEC.	REPLACEMENT DATA RAYTHEON PART No.	Haliadoran PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	6.6KΩ	3.6Ω	12C-23704-1	21H13 ⊥	A-3026	A-3678 ①	22S46 ⊥	8-7X ⊥	① Drill one new mounting hole.
			12C-23704 ③						⊥ Used in chassis 21T24 and 21T26.
			12C-24170 ③	21H04	A-2931	A-3678	24S52	8-51X	③ Used in chassis 21T25 and 21T27.

SPEAKER

ITEM No.	RATINGS SIZE	FIELD	V. C. IMP	REPLACEMENT DATA RAYTHEON PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3.6Ω	18A24681 ①	4A07	① Used in Models M-1761R, M-1762A, M-1763C, M-1763G & M-1762K
	4"	PM	3.6Ω	18A24163 ②	4A07	② Used in Models C-2158M, C-2165B, C-2163M & C-2163B
	5"	PM	3.6Ω	18A24663 ③	5A07	③ Used in Models M-2171R, M-2172C, M-2172G, M-2173A, M-2175C, M-2175G, & M-2178K.
	6"	PM	3.6Ω	18A23453 ④	6A1	④ Used in Models M-2165M, M-2165B, C-2167M, & C2167B.
	10"	PM	3.6Ω	18A24178 ⑤	10A31	⑤ Used in Models C-2168M & C-2163B.
	10"	PM	3.6Ω	18A21443 ⑥	10A31	⑥ Used in Models C-2163M & C-2163B.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	Ant. Trans.	0Ω	0Ω	1055-25235				
B	Ant. Trans.	0Ω	0Ω					
L2	IF Trap	0Ω						
L3A	Ant., RF, Mixer Grid, Osc. Coils	0Ω		1056-25236-2				Channel 2
B	Ant., RF, Mixer Grid, Osc. Coils	0Ω		1056-25236-3				Channel 3
C	Ant., RF, Mixer Grid, Osc. Coils	0Ω		1056-25236-4				Channel 4
D	Ant., RF Mixer Grid, Osc. Coils	0Ω		1056-25236-5				Channel 5
E	Ant., RF, Mixer Grid, Osc. Coils	0Ω		1056-25236-6				Channel 6
F	Ant., RF, Mixer Grid, Osc. Coils	0Ω		1056-25236-7				Channel 7
G	Ant., RF, Mixer Grid, Osc. Coils	0Ω		1056-25236-8				Channel 8
H	Ant., RF, Mixer Grid, Osc. Coils	0Ω		1056-25236-9				Channel 9
I	Ant., RF, Mixer Grid, Osc. Coils	0Ω		1056-25236-10				Channel 10
J	Ant., RF, Mixer Grid, Osc. Coils	0Ω		1056-25236-11				Channel 11
K	Ant., RF, Mixer Grid, Osc. Coils	0Ω		1056-25236-12				Channel 12
L	Ant., RF, Mixer Grid, Osc. Coils	0Ω		1056-25236-13				Channel 13
L4	RF Coil	0Ω		1056-25237				
L5	1st Video IF	.8Ω		1056-25238				
L6	2nd Video IF	.1Ω		201-23629		17-1004 *	TV-103*	6189 m
L7	3rd Video IF	.1Ω		201-24043				Includes caps. & resistors.
L8	RF Choke	2.5Ω		201-20265		19-3056	TV-180	6179	3% 2 Microhenries
L9	4th Video IF	.2Ω	.2Ω	133-23887				
L10	Series Peaking Coil	2.4Ω		16A-23923		19-6022		6183	22 Microhenries
L11	Series Peaking Coil	3.4Ω		16A-23923		19-6022		6183	22 Microhenries
L12	Shunt Peaking Coil	24Ω		16A-19365		19-4400		6186	410 Microhenries
L12A	4.5MC Trap	2.5Ω		13C-24963				
B	1st Sound IF	2.5Ω						
L14	Series Peaking Coil	9Ω		16A-21291		19-3300		6196	306 Microhenries
L15	Shunt Peaking Coil	8Ω		16A-20970		19-3350	TV-186	6130	270 Microhenries
L16	Series Peaking Coil	2.8Ω		16A-24090		19-1006		4613	11 Microhenries
L17	2nd Sound IF	.3Ω	.3Ω	201-23673				6203	
L18	Quadrature Coil	5.2Ω	80Ω	201-23727		19-1005		1480	
L19	Horiz. Osc.	29Ω		13M-24440				6213	
L20	Horiz. Phase	39Ω		13M-24441		20-1049a	MWC-1	6214	
L21	RF Choke	2.7Ω		16A-21701		19-1005		4613	8 Microhenries
L22	RF Coil	1.6Ω		16A-23916					2.2 Microhenries-Note 1

Note 1. Used in chassis 21T24, 21T25, and 21T27.
* Parallel with 5MMF cap. & enlarge mounting hole.
■ Parallel with 5MMF cap.
▲ Enlarge mounting hole.

FILTER CHOKE

ITEM No	RATINGS TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (@ CURRENT 1000 ⁻⁶A)	REPLACEMENT DATA RAYTHEON PART No.	Haliadoran PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L23	230ADC	39.5Ω	6HY	16A-23889-1			C-2328 ②	28C41 ③	C-33X ③
				16A-23889 ①					
				16A-24655 ③			C-2328 ③		C-33X ③

① Alternate filter choke.
② Choke used in 21" models.
③ Drill one new mounting hole.

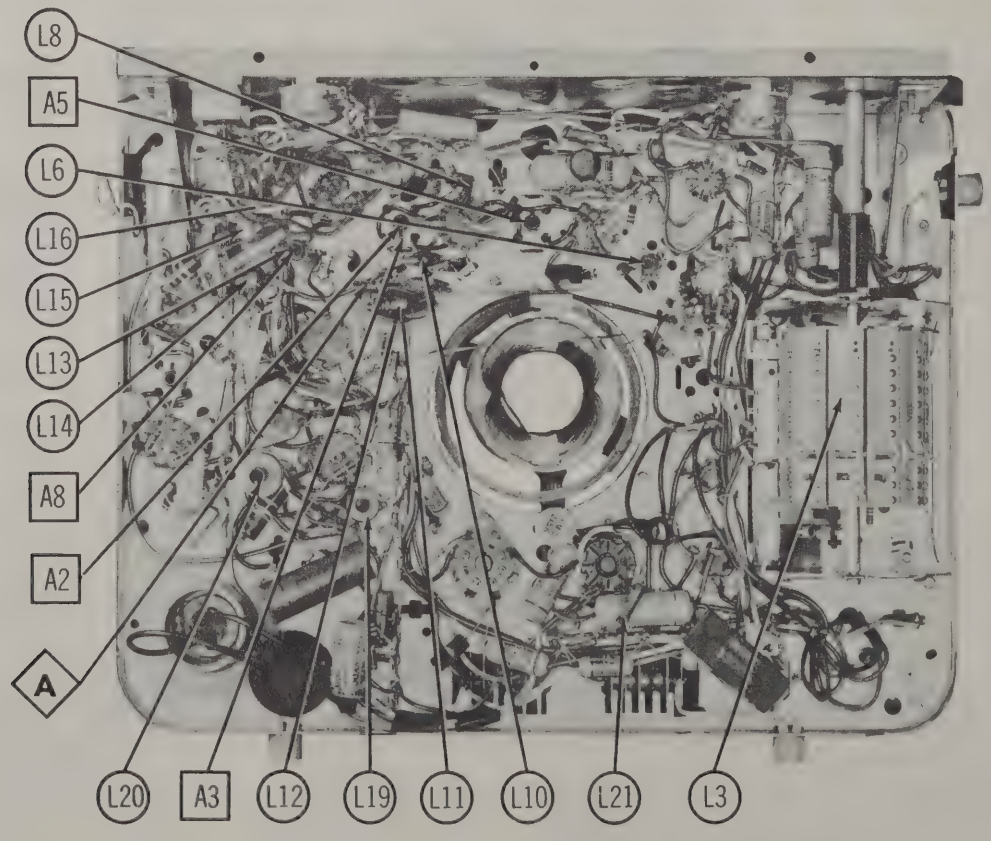
PARTS LIST AND DESCRIPTIONS (Continued)

SELENIUM RECTIFIER

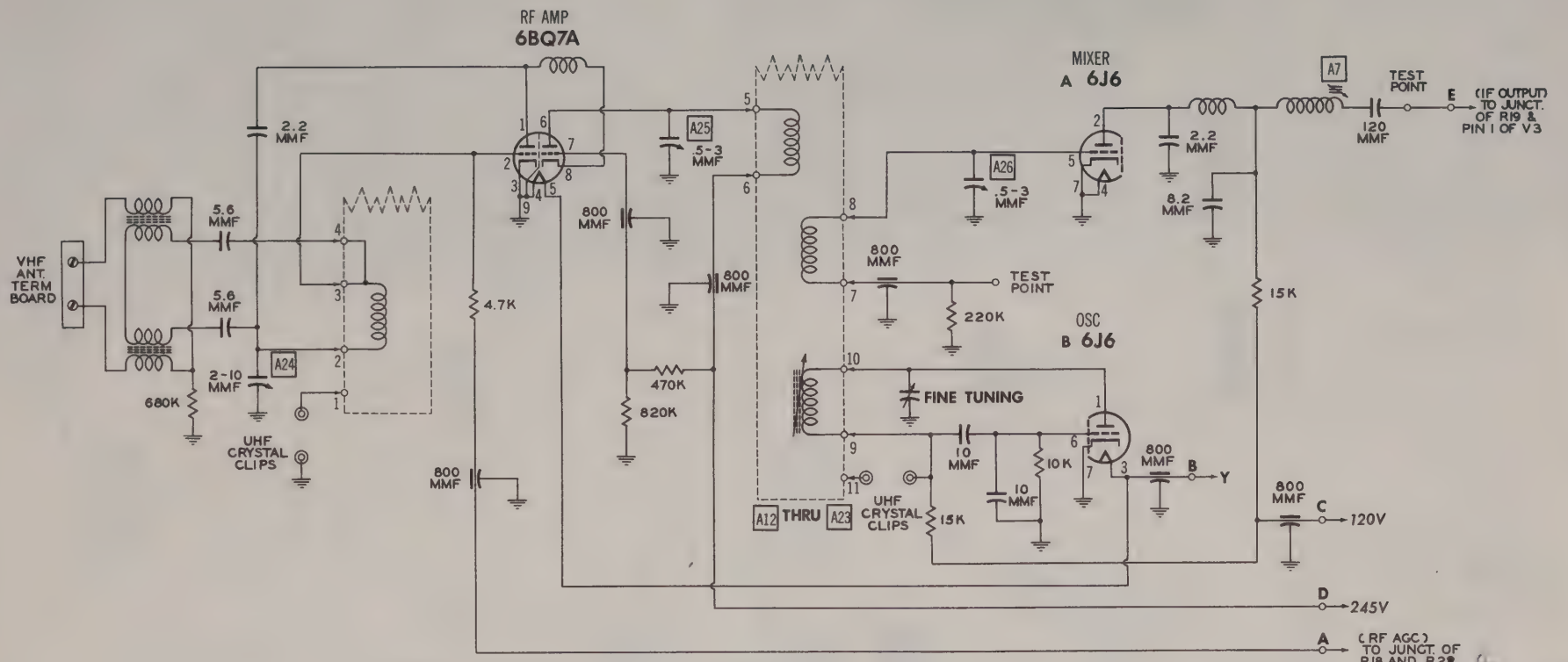
ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	RAYTHEON PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	..260ADC	21J23840	1236A	MR-300	6S300	6Q4	300	① Used in 21" Models.
M2	. 260ADC	21J23840 21J20097 ① 21J20097 ①	1236A	MR-300	6S300	6Q4	300	

MISCELLANEOUS

ITEM No.	PART NAME	RAYTHEON PART No.	NOTES
M3	Tuner	D-211-24586	VHF-Chassis 17T183, 21T193, 21T26
	Tuner		VHF-Chassis 21T24, 21T25, & 21T27
	Tuner		VHF-Chassis 21T193C
M4	Switch	201-24480	Local-Fringe-Used in chassis 21T24, 21T27, 21T25 only.
M5	Centering Device	16M-24493	Chassis 17T183, 21T193, 21T193C
	Centering Device	16M-23770	Chassis 21T26, 21T24, 21T25, 21T27
M6	Ion Trap	16M-19705	Chassis 17T183, 21T193, 21T193C
	Ion Trap	16M-19706	Chassis 21T26, 21T24, 21T25, 21T27
M7	Correct Ion Magnet	16M-22607	Models M-2165M, M-2165B, C-2166M, C-2166B
	Correct Ion Magnet	16M-21526	Models C-2163M, C-2163B
	Cabinet	2B-24661-A168	Top-Model M-1761E
	Cabinet	2B-24661-A145	Top-Model M-1762C
	Cabinet	2B-24661-A147	Top-Model M-1762G
	Cabinet	2B-24661-A148	Top-Model M-1762K
	Cabinet	2B-24661-A169	Top-Model M-1762A
	Cabinet	2B-24662-A168	Top-Model M-2171E
	Cabinet	2B-24662-A145	Top-Models M-2172C, M-2173C
	Cabinet	2B-24662-A147	Top-Models M-2172G, M-2173G
	Cabinet	2B-24662-A169	Top-Model M-2173A
	Cabinet	2B-24662-A148	Top-Model M-2173K
	Cabinet	2B-24659-A168	Bottom-Model M-1761E
	Cabinet	2B-24659-A145	Bottom-Model M-1762C
	Cabinet	2B-24659-A147	Bottom-Model M-1762G
	Cabinet	2B-24659-A148	Bottom-Model M-1762K
	Cabinet	2B-24659-A169	Bottom-Model M-1762A
	Cabinet	2B-24660-A168	Bottom-Model M-2171E
	Cabinet	2B-24660-A145	Bottom-Models M-2172C, M-2173C
	Cabinet	2B-24660-A147	Bottom-Models M-2172G, M-2173G
	Cabinet	2B-24660-A169	Bottom-Model M-2173A
	Cabinet	2B-24660-A148	Bottom-Model M-2173K
	Cabinet	24D-24093	Model C-2163M
	Cabinet	24D-24108	Model C-2163B
	Cabinet	24D-24150	Model M-2165M
	Cabinet	24D-24151	Model M-2165B
	Cabinet	24D-24143	Model C-2166M
	Cabinet	24D-24152	Model C-2166B
	Cabinet	24D-24606	Model C-2167M
	Cabinet	24D-24607	Model C-2167B



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION



VHF TUNER USED WITH CHASSIS 21T193C

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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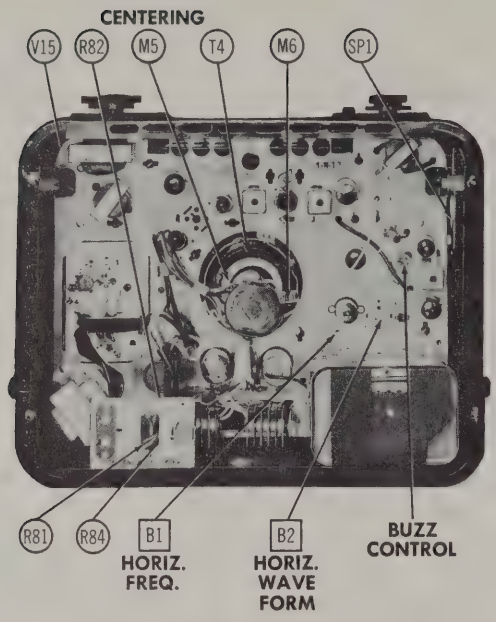
ALTERNATE TUNER SCHEMATIC



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn set on and tune in a TV station, preferably a test pattern.

1. Set the horizontal hold control to its mid-range position.

2. Connect a short clip lead across horizontal stabilizer coil (L20).

3. Adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.

4. Remove short from L20.

5. Connect the vertical amplifier of an oscilloscope thru a low capacitor probe to junction of L19, L20, R72 and C71. Low side to chassis. Adjust the horizontal phase slug (B2) until waveform similar to Fig. 5 is obtained. While making this adjustment keep the picture in sync with the horizontal hold control and if necessary B1.

6. Remove scope from junction of L19, L20, R72 and C71.

7. Turn the horizontal hold control fully counter clockwise. The picture should fall out of sync at both extreme ends of the horizontal hold control with equal number of sloping diagonal bars at both ends. If necessary, repeat steps 1 thru 6.

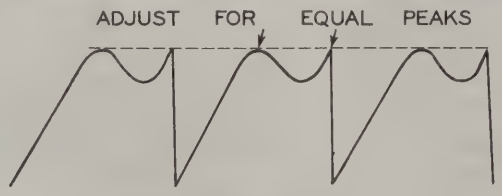
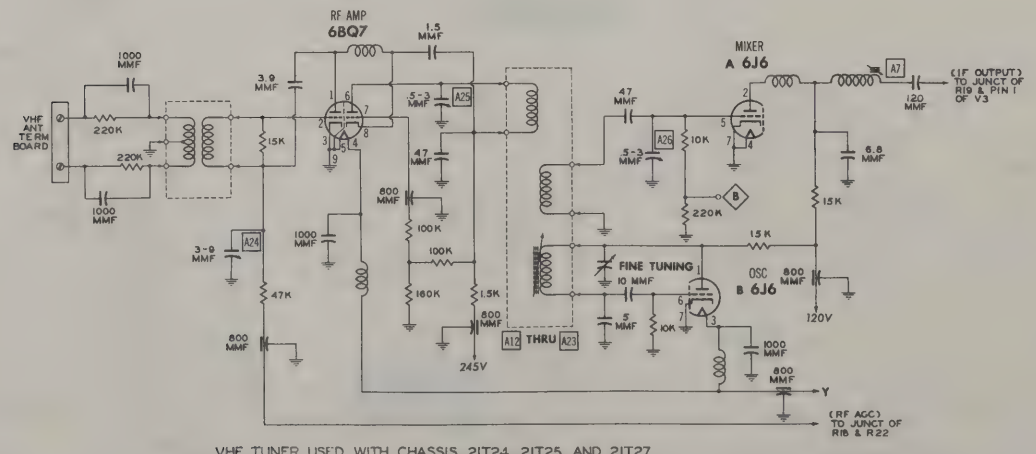


FIG. 5



VHF TUNER USED WITH CHASSIS 21T24, 21T25, AND 21T27

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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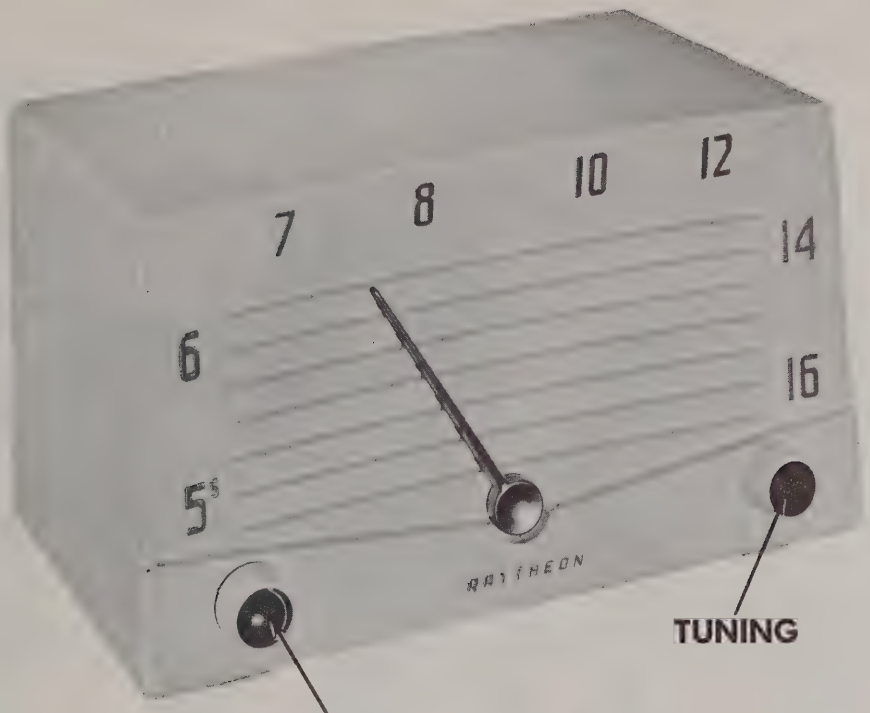
ALTERNATE TUNER SCHEMATIC

RAYTHEON MODELS 5R-10B, 5R-11W, 5R-12R (Ch. 5D166)



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DENVER, COLORADO

RAYTHEON MODELS 5R-10B, 5R-11W, 5R-12R (Ch. 5D166)

TRADE NAME	Raytheon Models 5R-10B, 5R-11W, 5R-12R (Ch. 5D166)
MANUFACTURER	Raytheon Mfg.Co., Tel. & Radio Div., 5921 W. Dickens Ave., Chicago 39, Ill.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types: 12BE6 Conv., 12BA6 IF Amp., 12AV6 (or) 12AT6 Det.-AVC-AF Amp., 50C5 Output 35W4 Rectifier
POWER SUPPLY	115 Volts AC-DC RATING .24 Amp. @ 115 Volts AC
TUNING RANGE—BROADCAST	540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1620KC	"	"	A5	"
3.	"	"	535KC	Tuning gang fully closed	"		Check for ample range.
4.	Direct	Loop	1400KC	Tune to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: RAYTHEON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det.-AVC-1st AF Amplifier	12AV6	12AV6	7BT	12AT6 used as alternate
V4	Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: RAYTHEON PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1A	50	150	8C-17391	TCD497	TDL-5030-150	MTD-301	Blue
B	30	150					Red

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: RAYTHEON PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C2	.05	200	8D-10770	DF-503		PT415	
C3A	220		♦201-19303	♦PC-151	♦1408-02		
B	5000						
C	5000						
D	250						
E							
C4	.02	400	8D-10774	DF-203	817-02	PT412	
C5	.047	400	8J-16081	DF-503		PT4147	
C6	.09	400	8D-11251	DF-104		PT401	

♦ Items C3A, C3B, C3C, C3D, C3E, R5A, R5B and R5C are combined in one unit. When replacing items separately, items C3D and C3E should total 250MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RAYTHEON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	A10A-19788	AB-70	A47-1Meg-Z	Q13-137	U-53	Volume
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	KB-1	SWE-12	76-1	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: RAYTHEON PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	47KΩ	½	9B1-82	BTS-47K	
R3	3.3Meg	½	9B1-34	BTS-3.3Meg	
R4	68Ω	½	9B1-48	BTS-68	
R5A	6.8Meg	½	♦201-19303	BTS-6.8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	

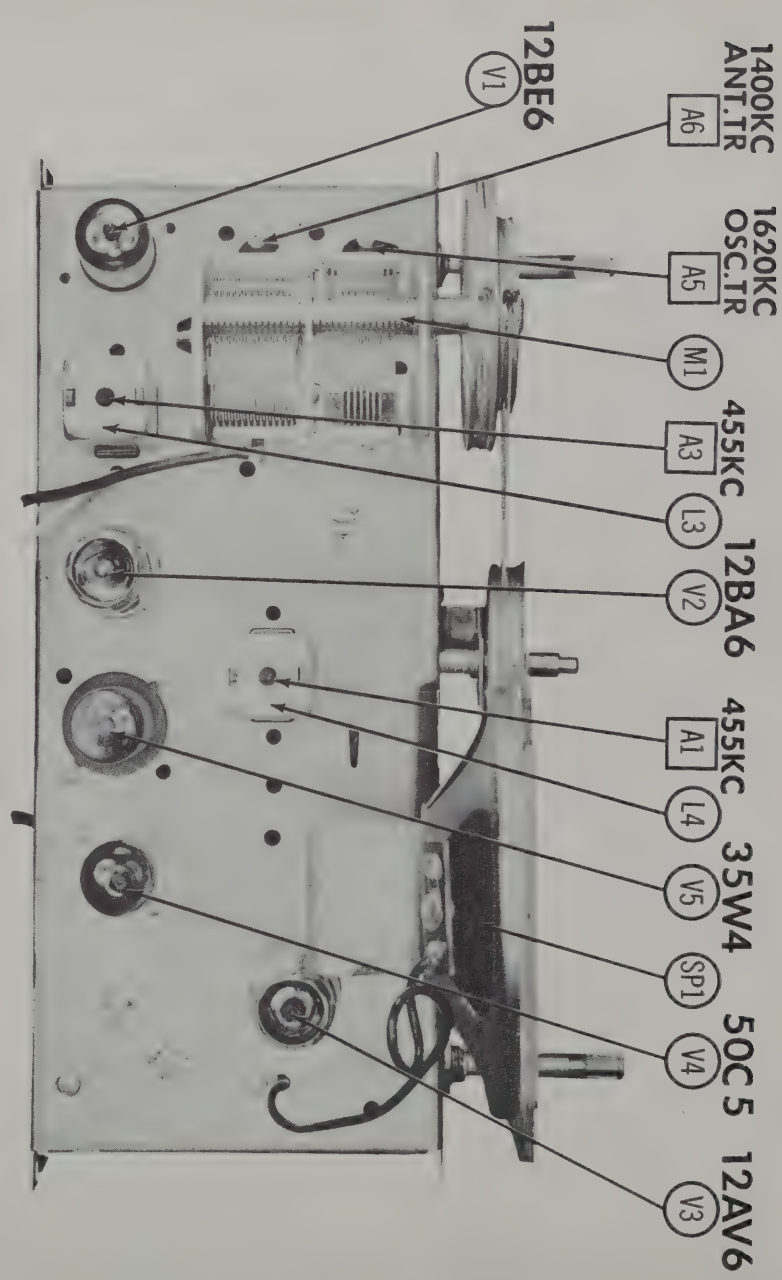
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: RAYTHEON PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R6	150Ω	½	9B1-52	BTS-150	
R7	1000Ω	1	9B2-62	BTA-1000	
R8	27Ω	½		BTS-27	Note 1
R9	220KΩ	½	9B1-27	BTS-220K	

♦ Items C3A, C3B, C3C, R5A, R5B, R5C are combined in one unit.
Note 1. Not used in some versions.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2.4KΩ	3.5Ω	12C17595 12C19302 ①	Z1101	A-3025	A-3332	26S58 ②	S-12X	① Alternate audio output transformer ② Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	RAYTHEON PART No.	QUAM PART No.	
SP1	4"	PM	3.5Ω	18A-19554-1	4A07	

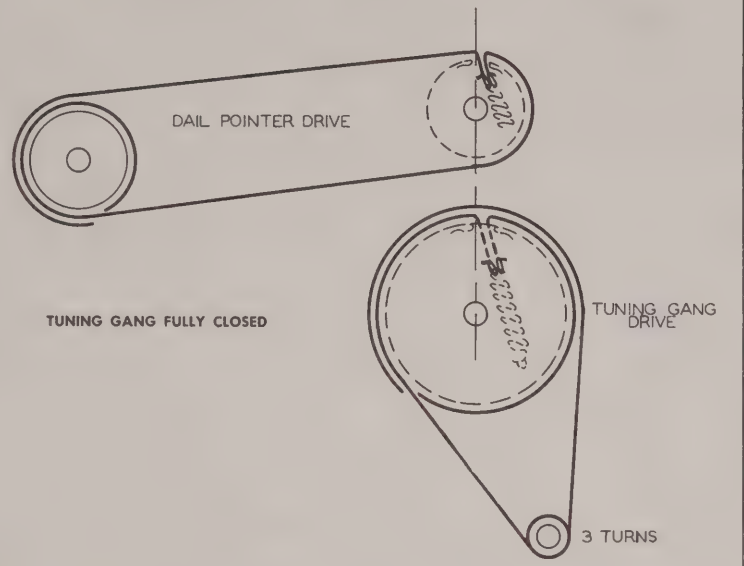
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3Ω		13E-19560-2				Includes cabinet back
L2	Osc. Coil	.8Ω	5.8Ω	13D-17583	14-1073		69-OSC *	
L3	Input IF	14Ω	14Ω	13B-17731-1	16-6758	BC-352	12-C1	
L4	Output IF	14Ω	14Ω	13B-17731-1	16-6758	BC-353	12-C2	

* Drill mounting hole.

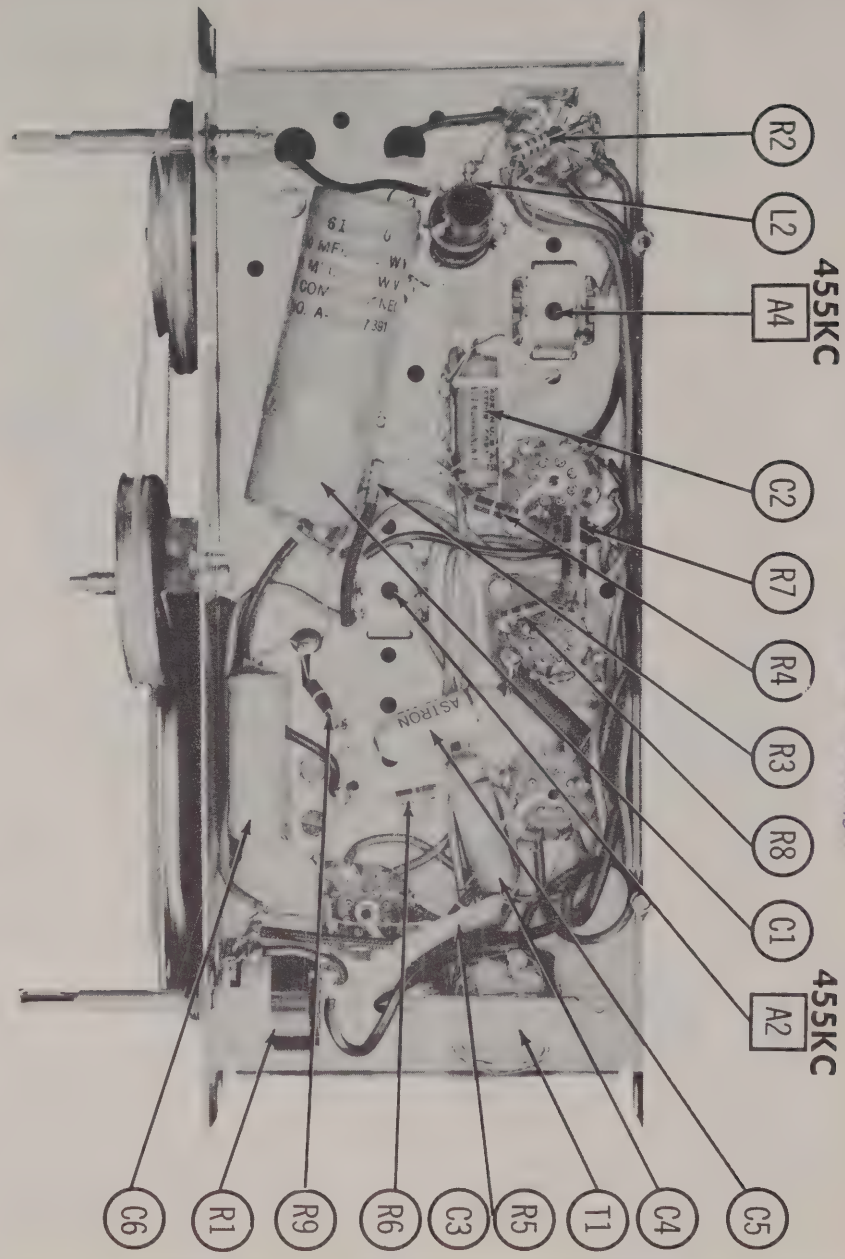
MISCELLANEOUS

ITEM No.	PART NAME	RAYTHEON PART No.	NOTES
M1	Tuning Cap.	8A-20219	2 Gang (29-455MMF, 46-170MMF)
	Cabinet	5C-19530-1-A12S	Mahogany
	Cabinet	5C-19530-1-A87	White
	Cabinet	5C-19530-1-A89	Red
	Knob	5B-18164-A74	Tuning & on-off-volume - Mahogany
	Knob	5B-18164-A87	Tuning & on-off-volume - White
	Knob	5B-18164-A89	Tuning & on-off-volume - Red
	Pointer	2G-19559	

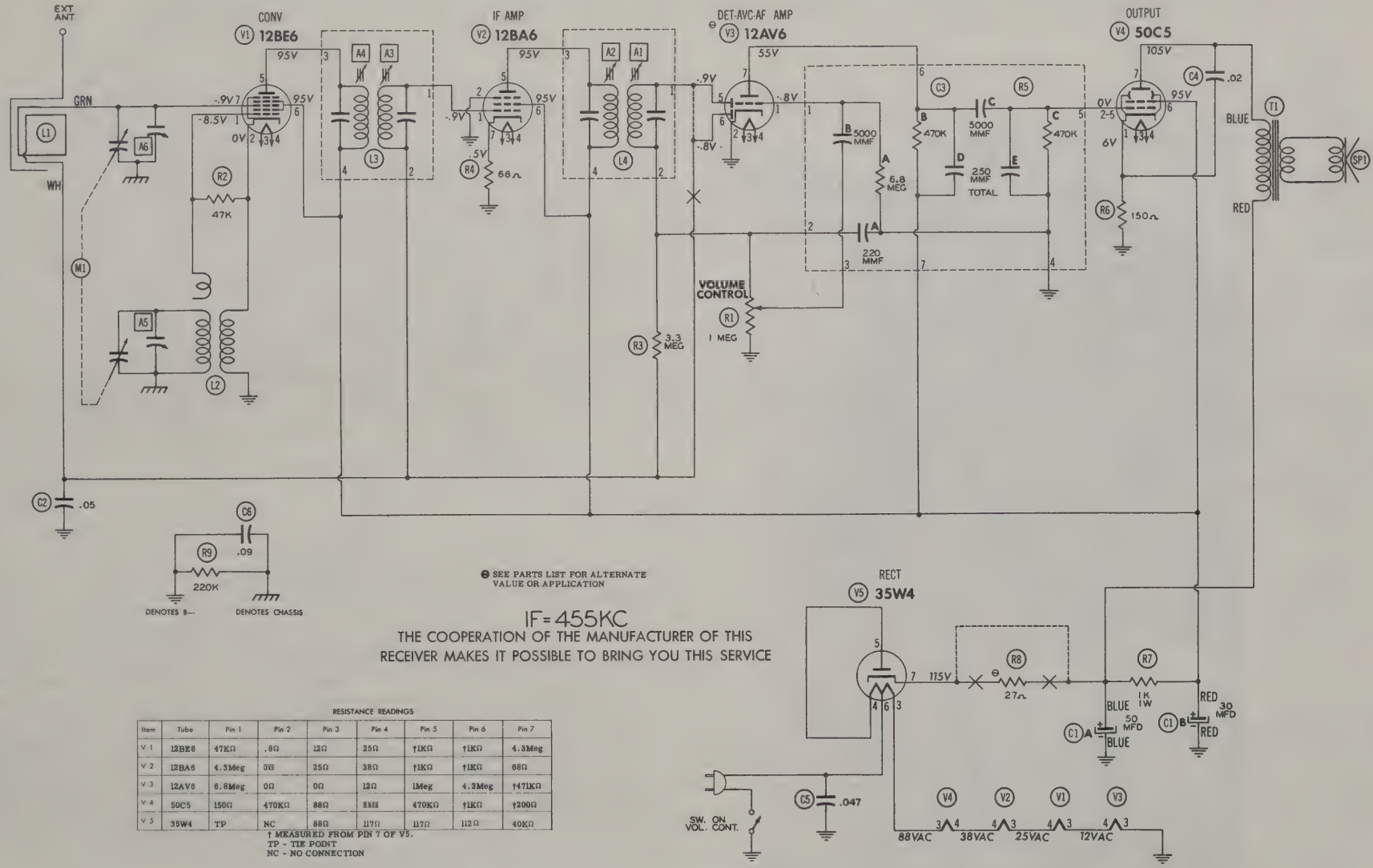


DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



RAYTHEON MODEL 5R-10B (Ch. 5D166)



⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	47KΩ	.8Ω	12Ω	25Ω	†1KΩ	†1KΩ	4.3Meg
V 2	12BA6	4.3Meg	0Ω	25Ω	38Ω	†1KΩ	†1KΩ	68Ω
V 3	12AV6	6.8Meg	0Ω	0Ω	12Ω	1Meg	4.3Meg	†47KΩ
V 4	50C5	150Ω	470KΩ	88Ω	[illegible]	470KΩ	†1KΩ	†200Ω
V 5	35W4	TP	NC	88Ω	117Ω	117Ω	112Ω	40KΩ

† MEASURED FROM PIN 7 OF V5.
TP - TIE POINT
NC - NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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DENVER, COLORADO

RHEIN
MODEL 104

RHEIN
MODEL 104

TRADE NAME	Rhein Model 104
MANUFACTURER	Rhein Sound Systems, Inc., 2 Coburn Ave., P. O. 5516, Orlando, Fla.
TYPE SET	AC Operated 2 Channel 10 Watt Audio Amplifier
TUBES (Five)	Types: 6SJ7 Mic Preamp., 6SL7GT AF Amp. -Phase Inv., (2) 6V6GT Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles
RATING	.6 Amp. @ 117 Volts AC

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PARTS LIST AND DESCRIPTIONS

RHEIN Model 104

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: RHEIN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Mic Preamp.	6SJ7	6SJ7	8N	
V2	AF Amp. - Phase Inv.	6SL7GT	6SL7GT	8BD	
V3	Audio Output	6V6GT	6V6GT	7AC	
V4	Audio Output	6V6GT	6V6GT	7AC	
V5	Rect.	5Y3GT	5Y3GT	5T	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: RHEIN PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1A	▲40	450		FP367.5	TM-3059	Q-410	
B	■20	450					
C	▲25	50					
C2A	■10	450		FP231	TM-D10-450	D-200	
B	▲10	450					
C3	25	25		TC26	TD-25-25	FM-0225	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: RHEIN PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C4	.022	400		DF-203		PT4122	
C5	.022	400		DF-203		PT4122	
C6	.022	400		DF-203		PT4122	
C7	.0047	400		D6-472	GP2-333-472	PT6247	
C8	.047	400		DF-503		PT4147	
C9	.047	400		DF-503		PT4147	
C10	.047	400		DF-503		PT4147	Note 1

Note 1. Not used in some versions.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RHEIN PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½		AB-60	A47-500K-Z	Q13-133	U-48	Tone
B	Shaft			AK-4	KSS43	Not Req.	Not Req.	Attach to R1A.
C	Switch			KB-1	SWE-12	76-1	US-26	Attach to R1A.
R2A	500KΩ	½		AB-60	A47-500K-Z	Q13-133	U-48	Phono Level
B	Shaft			AK-4	KSS-3	Not Req.	Not Req.	Attach to R2A.
R3A	500KΩ	½		AB-60	A47-500K-Z	Q13-133	U-48	Microphone Level
B	Shaft			AK-4	KSS-3	Not Req.	Not Req.	Attach to R3A.

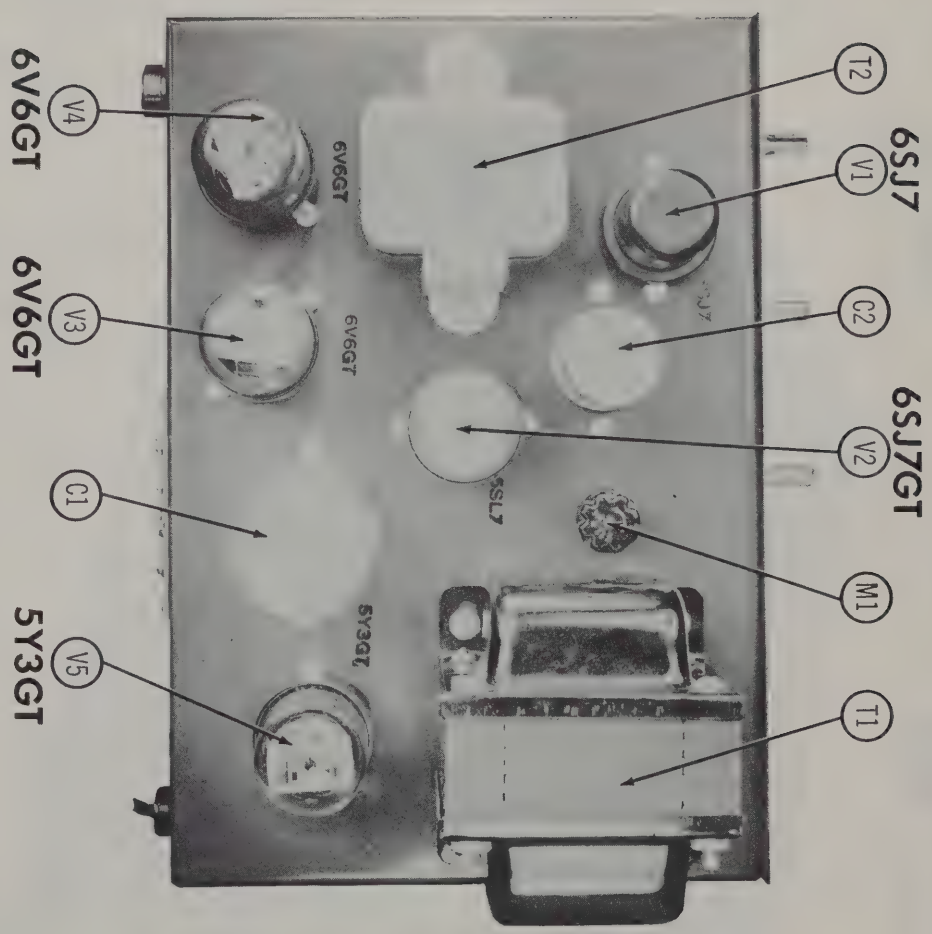
RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: RHEIN PART No.	IRC PART No.	NOTES
R4	2.2Meg	½		BTS-2.2Meg	
R5	2.2Meg	½		BTS-2.2Meg	
R6	470KΩ	½		BTS-470K	
R7	270KΩ	½		BTS-270K	
R8	68KΩ	½		BTS-68K	
R9	470KΩ	½		BTS-470K	
R10	2200Ω	½		BTS-2200	Note 1
R11	8200Ω	½		BTS-8200	Note 2

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: RHEIN PART No.	IRC PART No.	NOTES
R12	470KΩ	½		BTS-470K	
R13	10KΩ	½		BTS-10K	
R14	10KΩ	½		BTS-10K	
R15	470KΩ	½		BTS-470K	
R16	250Ω	4		PW4-250	
R17	470KΩ	½		BTS-470K	
R18	2500Ω	10		PW10-2500	

Note 1. Some versions use a 1KΩ ½W resistor in this application.
Note 2. Some versions use a 10KΩ ½W resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	RHEIN PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .60A	650VCT .083ADC	5VAC @2A	6.3VCT @1.7A				PC-8422①	24R02U	

① Redrill mounting holes, mount at right angle to original unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	RHEIN PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	4.3KΩ CT	16Ω Tap@ 8Ω @4Ω			A-3028 ①	A-3870			① Drill one new mounting hole.

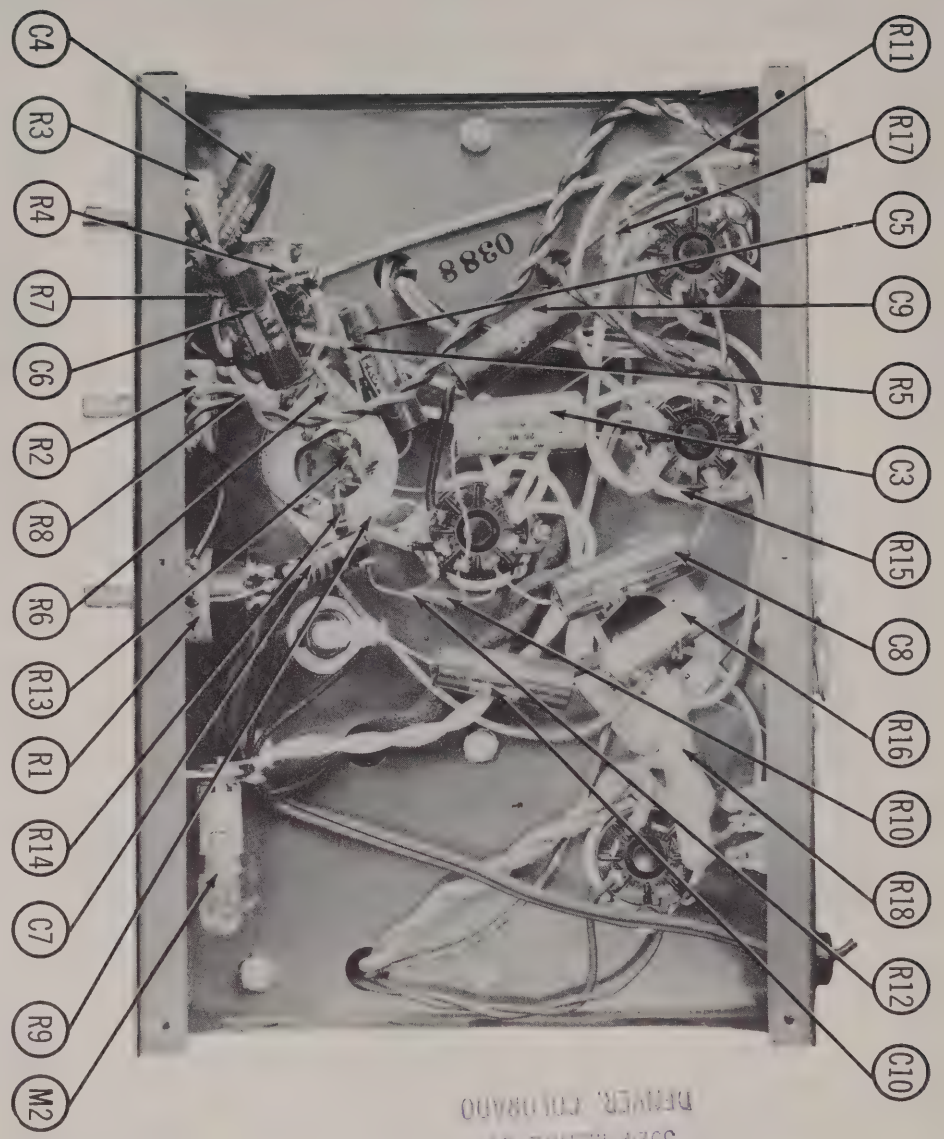
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			RHEIN PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	1½A 250V			3120l.5 (3AG 1½A)	342008	AGC 1½	HKP

MISCELLANEOUS

ITEM No.	PART NAME	RHEIN PART No.	NOTES
M2	Pilot Light		#47

CHASSIS—BOTTOM VIEW



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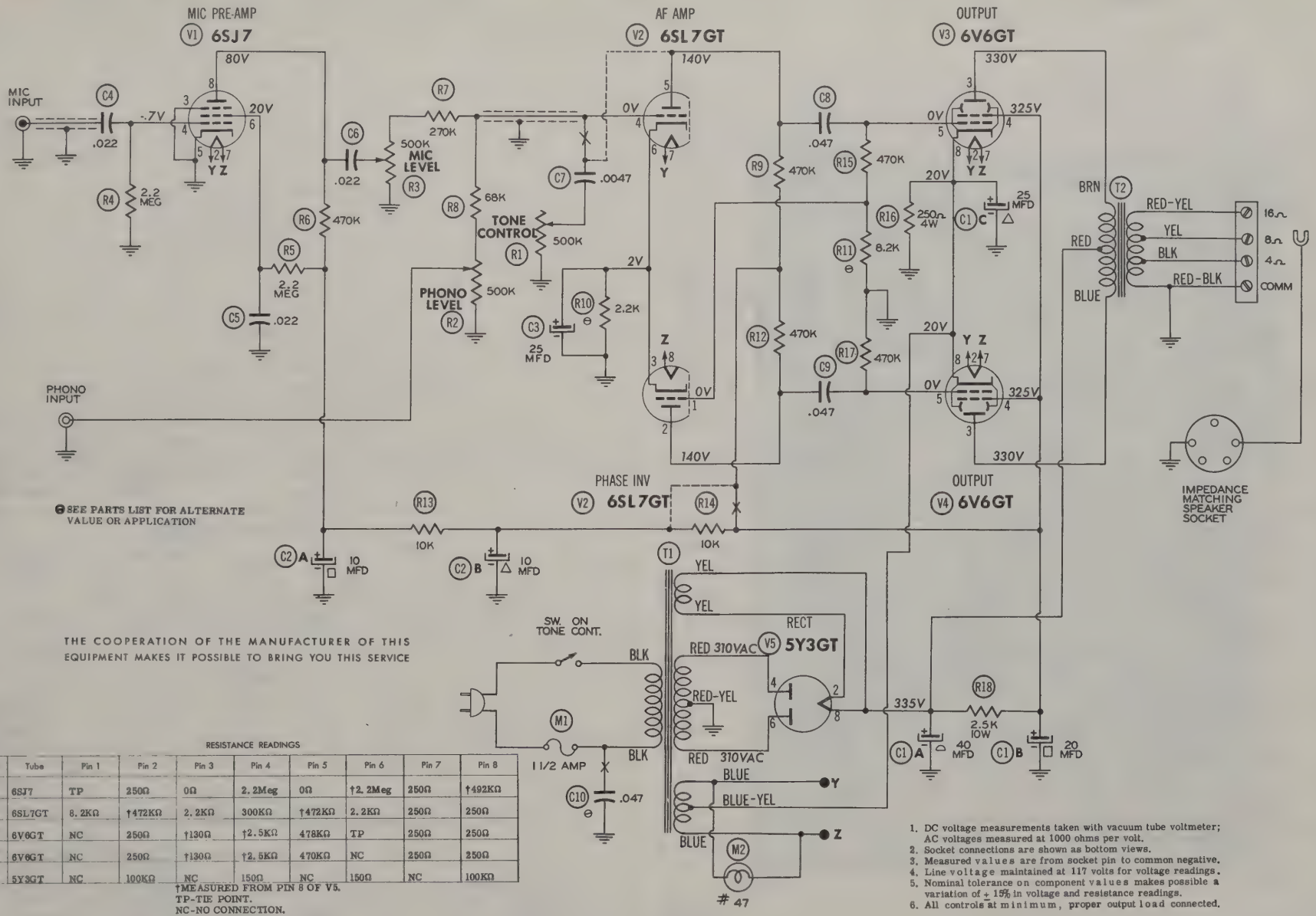

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SJ7	TP	250Ω	0Ω	2.2Meg	0Ω	†2.2Meg	250Ω	†492KΩ
V 2	6SL7GT	8.2KΩ	†472KΩ	2.2KΩ	300KΩ	†472KΩ	2.2KΩ	250Ω	250Ω
V 3	6V6GT	NC	250Ω	†130Ω	†2.5KΩ	478KΩ	TP	250Ω	250Ω
V 4	6V6GT	NC	250Ω	†130Ω	†2.5KΩ	470KΩ	NC	250Ω	250Ω
V 5	5Y3GT	NC	100KΩ	NC	150Ω	NC	150Ω	NC	100KΩ

†MEASURED FROM PIN 8 OF V5.
TP-TIE POINT.
NC-NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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303-12

SILVERTONE MODELS 6217, 6218 (Ch. 528.33300)

SILVERTONE MODELS 6217, 6218 (Ch. 528.33300)

TRADE NAME	Silvertone Models 6217, 6218 (Ch. 528.33300)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan, Chicago, Ill.
TYPE SET	Three Power Portable AM Superheterodyne Receiver
TUBES (Four)	Types: 1R5 Conv., 1U4 IF Amp., 1U5 Det.-AVC-AF Amp., 3V4 Output
POWER SUPPLY	110-120 Volts AC-DC (or) 3 Volts "A" Supply & 67.5 Volts "B" Supply
RATING	.1 Amp. @ 117 Volts AC (or) 150MA @ 3 Volts DC & 10MA @ 3 Volts DC
TUNING RANGE—BROADCAST	540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use battery power, if possible. If AC power is used, use an isolation transformer when available. If not, connect a .1MFD capacitor in series with low side of the signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 6 (grid) of 1U4 (V2). Low side to B-.	455KC (400~ Mod.)	Tuning gang fully open.	Across Voice Coil	A1, A2	Adjust for maximum output. IF AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.	"	High side to pin 6 (grid) of 1R5 (V1). Low side to B-.	"	"	"	A3, A4	"
3.	"	High side to antenna stator lug. Low side to B-.	1625KC	"	"	A5	"
4.		Loop	1400KC	Tune to 1400KC signal.	"	A6	Adjust for maximum output. (A6 located on antenna).
5.		"	600KC	Tune to 600KC signal.	"	A7	Adjust for maximum output while rocking tuning gang.

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PARTS LIST AND DESCRIPTIONS

SILVERTONE
Model 6217

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		SILVERTONE PART No.	STANDARD REPLACEMENT		
V1	Converter	1R5	1R5	7AT	
V2	IF Amp.	1U4	1U4	6AR	
V3	Det. -AVC-1st AF Amp.	1U5	1U5	5BW	
V4	Output	3V4	3V4	6BX	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	SILVERTONE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■70	150	T18-307				
B	▲30	150					
C	100	10					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	SILVERTONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	.05	400	T16-189	DF-503		PT415	
C3	5000		T15-320	DD-502	811-005	DC525	
C4A	150			DD-151	811-151	UC-5315	
B	2000			DD-202	801-002	DC522	
C	150		♦T17-105	DD-151	811-151	UC-5315	
D	10000			DD-103	811-01	DC-511	
E	5000			DD-502	811-005	DC525	
C5	2000		T15-241	DD-202	801-002	DC522	
C6	.1	200	T16-210	DF-104		PT401	
C7	.02	400	T16-196	DF-203	817-02	PT412	
C8	.02	400	T16-196	DF-203	817-02	PT412	

♦ Items C4A, C4B, C4C, C4D, C4E, R9A, R9B, R9C and R9D are combined in one unit.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SILVERTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	½	T24-205	B-70-S	A47-1Meg-Z	Q13-133	U-53	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	Not Req.	SWE-20	76-2	US-27	Attach to R1A

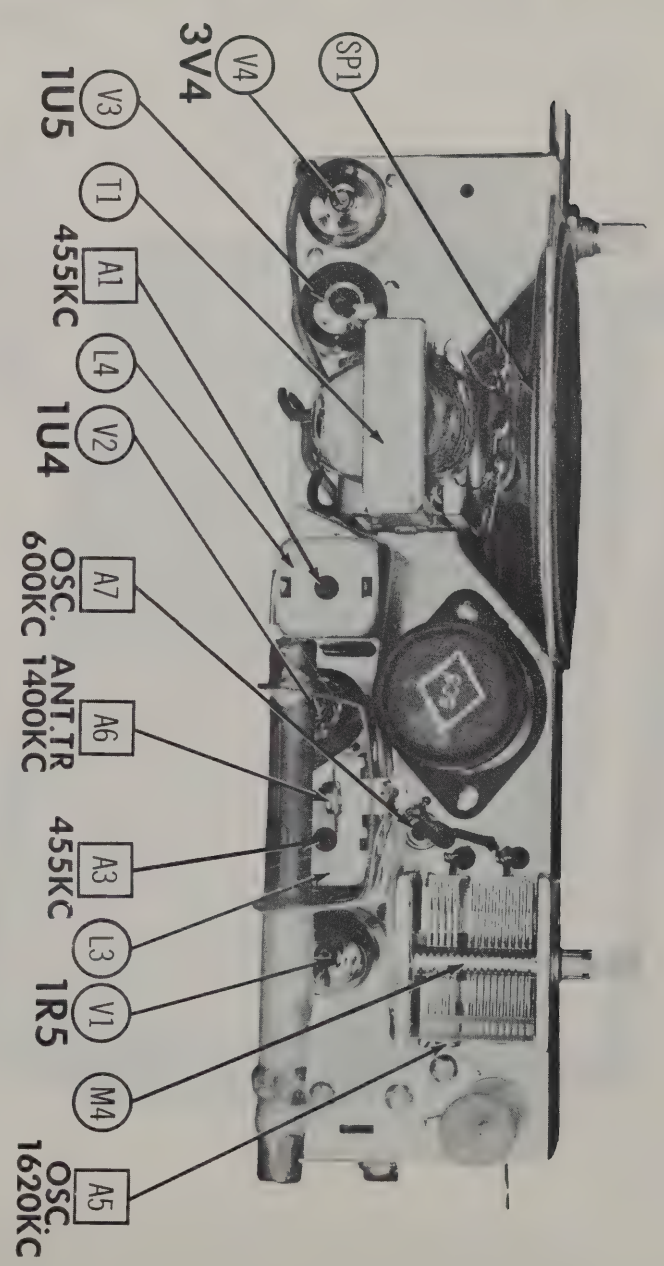
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SILVERTONE PART No.	IRC PART No.	
R2	470Ω	½	S604710K	BTS-470	
R3	1500Ω	½	S601520K	BTS-1500	
R4	100KΩ	½	S601040M	BTS-100K	
R5	27Ω	½	S602700K	BTS-27	
R6	2.2Meg	½	S602250M	BTS-2.2Meg	
R7	10Meg	½	S601060M	BTS-10Meg	
R8	47K	½	S604730M	BTS-47K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SILVERTONE PART No.	IRC PART No.	
R9A	10Meg	½	♦T17-105	BTS-10Meg	
B	4.7Meg	½		BTS-4.7Meg	
C	1Meg	½		BTS-1Meg	
D	3.3Meg	½		BTS-3.3Meg	
R10	1500Ω	½	S601520K	BTS-1500	
R11	2200Ω	½	S602220K	BTS-2200	
R12A	160Ω	10	†T61-9		
B	2000Ω	10			
R13	270Ω	½	S602710K	BTS-270	

♦ Items C4A, C4B, C4C, C4D, C4E, R9A, R9B, R9C, R9D are combined in one unit.
† Items R12A, R12B are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	9.8KΩ	3.7Ω	60-322			A-3329 ①	S-11X ①		① Bend mounting tabs down, file out mounting slots, mount on original mounting bracket.

SPEAKER

ITEM No.	RATINGS SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: SILVERTONE PART No.	QUAM PART No.	NOTES
SP1	3½"	PM	3.7Ω	79-445	3A07 ①	① Cut corner off, same as original unit.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: SILVERTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coil	.9Ω		T82-95				
L2	Osc. Coil	1.9Ω	9.5Ω	T10-694				
L3	Input IF	20Ω	20Ω	T10-508	16-6758	BC-352	12-C1	
L4	Output IF	20Ω	20Ω	T10-508	16-6758	BC-353	12-C2	

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA: SILVERTONE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.061A	83-642	1002A	RS065	6S65	8J1	65	

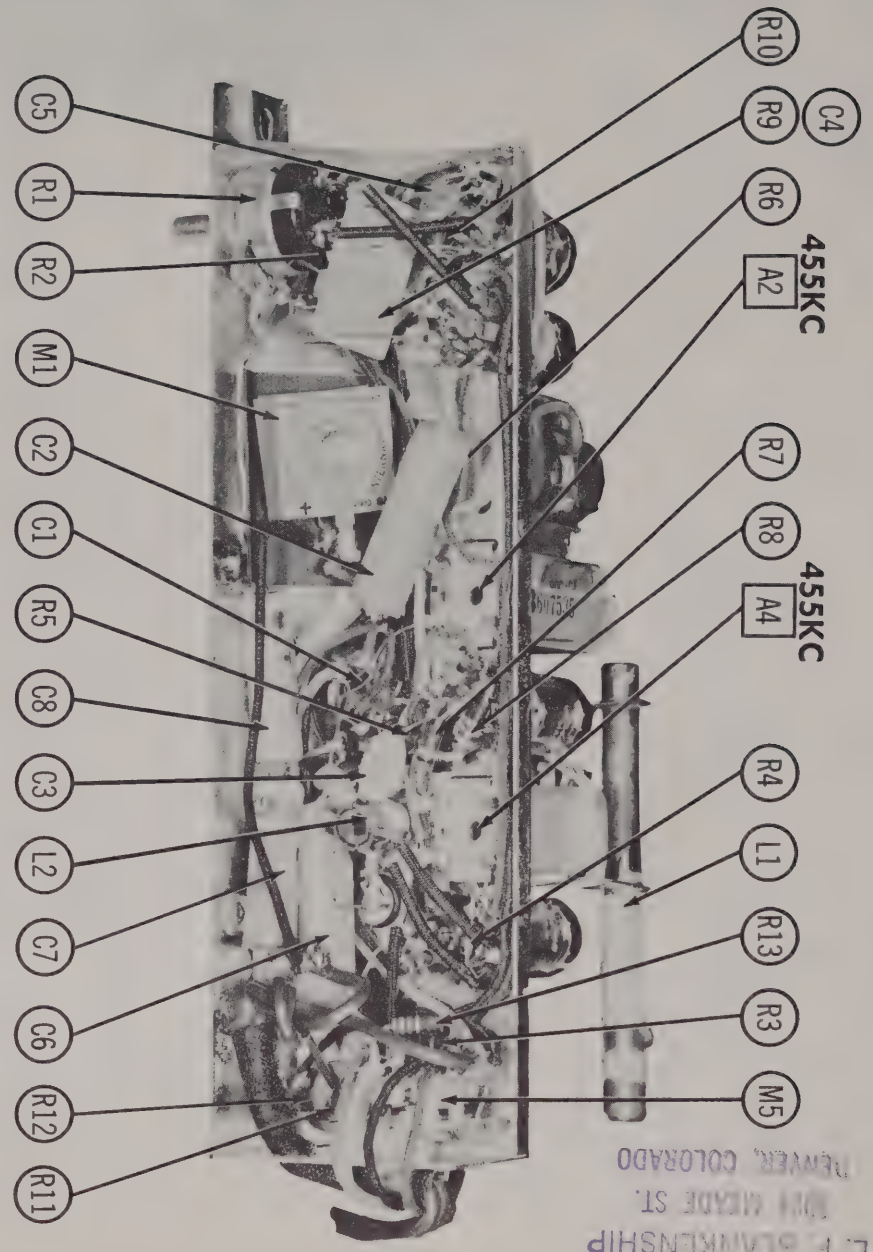
BATTERIES

ITEM No.	VOLTAGE	SILVERTONE PART No.	REPLACEMENT DATA: EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
M2	3V "A"	No. 6442	964			2IR			Connect 2 in series
M3	67.5V "B"	No. 6482		477			P45		

MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M4	Tuning Cap.	T19-244	2 Gang (8-230MMF; 10-90MMF)
M5	Switch	T69-202	Power Changeover (5 Pole-2 Position)
	Cabinet	T42-724	Model 6217
	Cabinet	T42-736	Model 6218
	Handle	T53-20	Model 6217
	Handle	T53-21	Model 6218
	Knob	T52-570	Tuning
	Knob	T52-571	On-Off-Volumes
	Pointer	T58-110	
	Dial Scale	T67-587	Model 6217
	Dial Scale	T67-588	Model 6218
	Crystal	T48-100	

CHASSIS—BOTTOM VIEW



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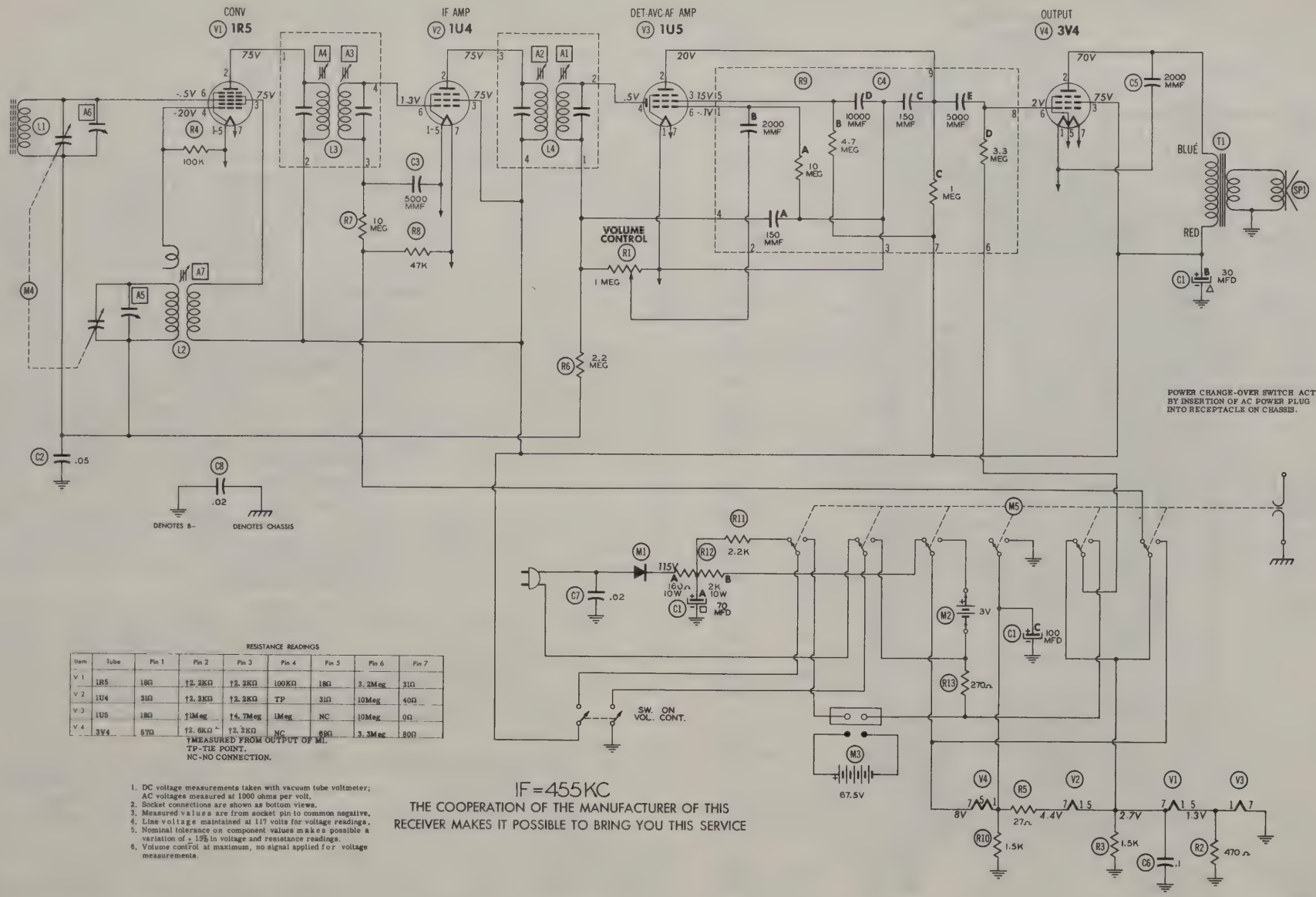

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	18Ω	†2.2KΩ	†2.2KΩ	100KΩ	18Ω	3.2Meg	31Ω
V 2	1U4	31Ω	†2.2KΩ	†2.2KΩ	TP	31Ω	10Meg	40Ω
V 3	1U5	18Ω	†1Meg	†4.7Meg	1Meg	NC	10Meg	0Ω
V 4	3V4	57Ω	†2.6KΩ	†2.2KΩ	NC	69Ω	3.3Meg	80Ω

†MEASURED FROM OUTPUT OF M1.
TP-TIE POINT.
NC-NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

IF=455KC

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TRAV-LER MODELS 517-82U, 521-79U, -80U, -81U, -R90U, -R91U, 5210-60U, -61U (Ch. 417E4, 417E5, 417G5)

E. F. BLA... 3924 ... DENVER, COLORADO

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TRAV-LER MODELS 517-82U, 521-79U, -80U, -81U, -R90U, -R91U, 5210-60U, -61U (Ch. 417E4, 417E5, 417G5)

TRAV-LER MODEL 517-82U

TRADE NAME	TRAV-LER	MODELS	CHASSIS
		517-82U, 521-79U, 521-80U, 521-81U, 5210-60U, 5210-61U	417E4 or 417E5
		521-R90U, 521-R91U	417G5
MANUFACTURER	Trav-ler Radio & Television Corp., 571 W. Jackson Blvd., Chicago, Ill.		
TYPE SET	Television Receiver		
TUBES	Twenty-one		
POWER SUPPLY	110-120 Volts AC-60 Cycle	RATING	1.7 Amp. @ 117 Volts AC
TUNING RANGE-	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

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TRAV-LER MODELS 517-82U, 521-79U, -80U, -81U, -R90U, -R91U, 5210-60U, -61U (Ch. 417E4, 417E5, 417G5)

PROPERTY OF

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 6 push-on type control knobs from front panel of cabinet.
2. Remove 2 wood screws and 3 metal screws. Remove rear cover.
3. Remove 2 wood screws holding antenna bracket.
4. Disconnect speaker leads.
5. Remove 4 chassis bolts. Remove chassis.
6. Remove 4 speaker nuts. Remove speaker.

MODELS	CHASSIS
517-82U, 521-79U, 521-80U, 521-81U, 5210-60U, 5210-61U	417E4/417E5
521-R90U, 521-R91U	417G5

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet above and slightly to the left (hole extends thru UHF tuner) of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator (L20) can be made from the rear panel of the chassis. L20 is used as the horizontal hold control. Adjust L20 until picture synchronizes horizontally. Check by switching off channel and back again.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (A10) located on top of chassis.

FUSES

Two fuses are used. One for horizontal sweep circuit protection and one for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

TRAV-LER MODELS 517-82U, 521-79U, -80U, -81U, -R90U, -R91U, 5210-60U, -61U (Ch. 417E4, 417E5, 417G5)

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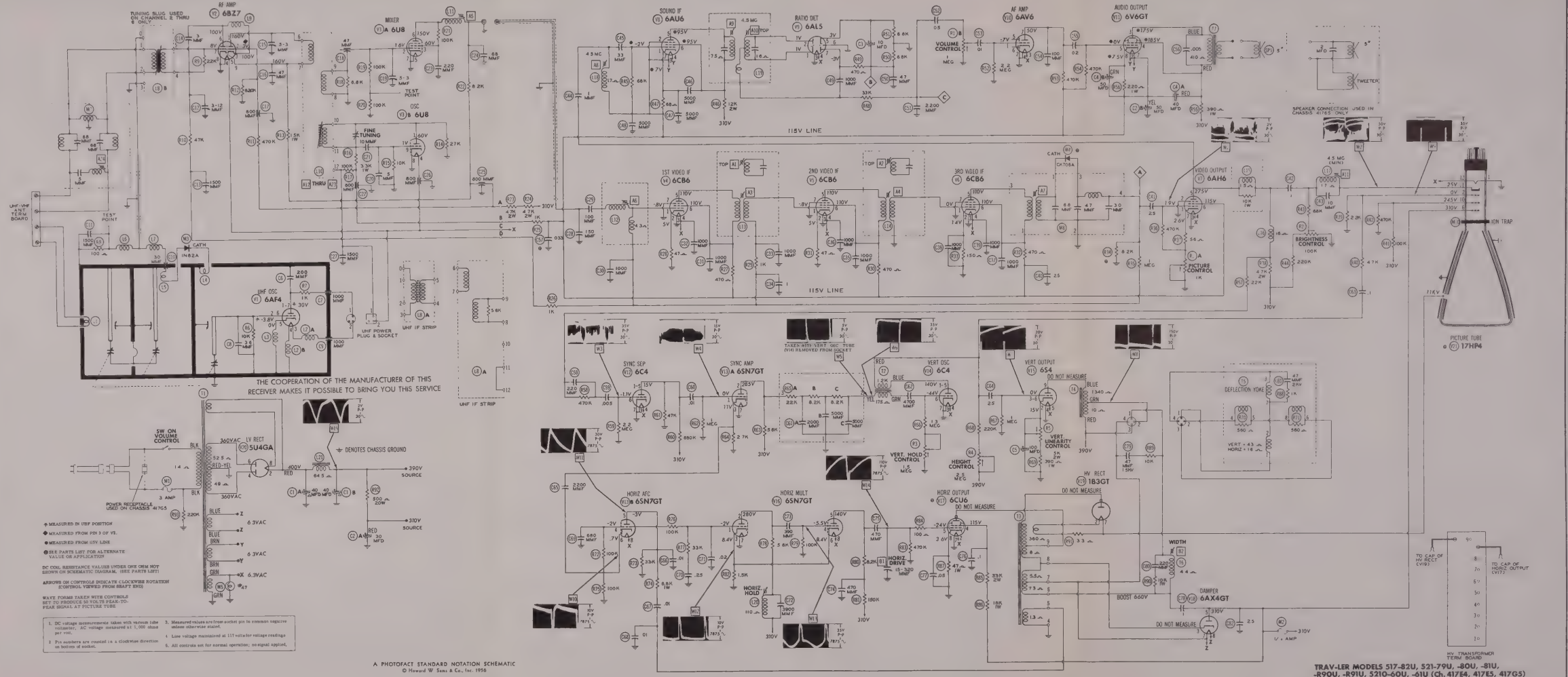
RF AMP V2 6BZ7
MIXER V3A 6U8
OSC V3B 6U8
SOUND IF V8 6AU6
RATIO DET V9 6AL5
AF AMP V10 6AV6
AUDIO OUTPUT V11 6V6GT
1ST VIDEO IF V4 6CB6
2ND VIDEO IF V5 6CB6
3RD VIDEO IF V6 6CB6
VIDEO OUTPUT V7 6AH6
UHF OSC V1 6AF4
SYNC SEP V12 6C4
SYNC AMP V13A 6SN7GT
VERT OSC V14 6C4
VERT OUTPUT V15 6S4
HORIZ AFC V13B 6SN7GT
HORIZ MULT V16 6SN7GT
HORIZ OUTPUT V17 6CU6
HV RECT V19 1B3GT
DAMPER V18 6AX4GT
LV RECT V20 5U4GA
PICTURE TUBE V21 17HP4
115V LINE
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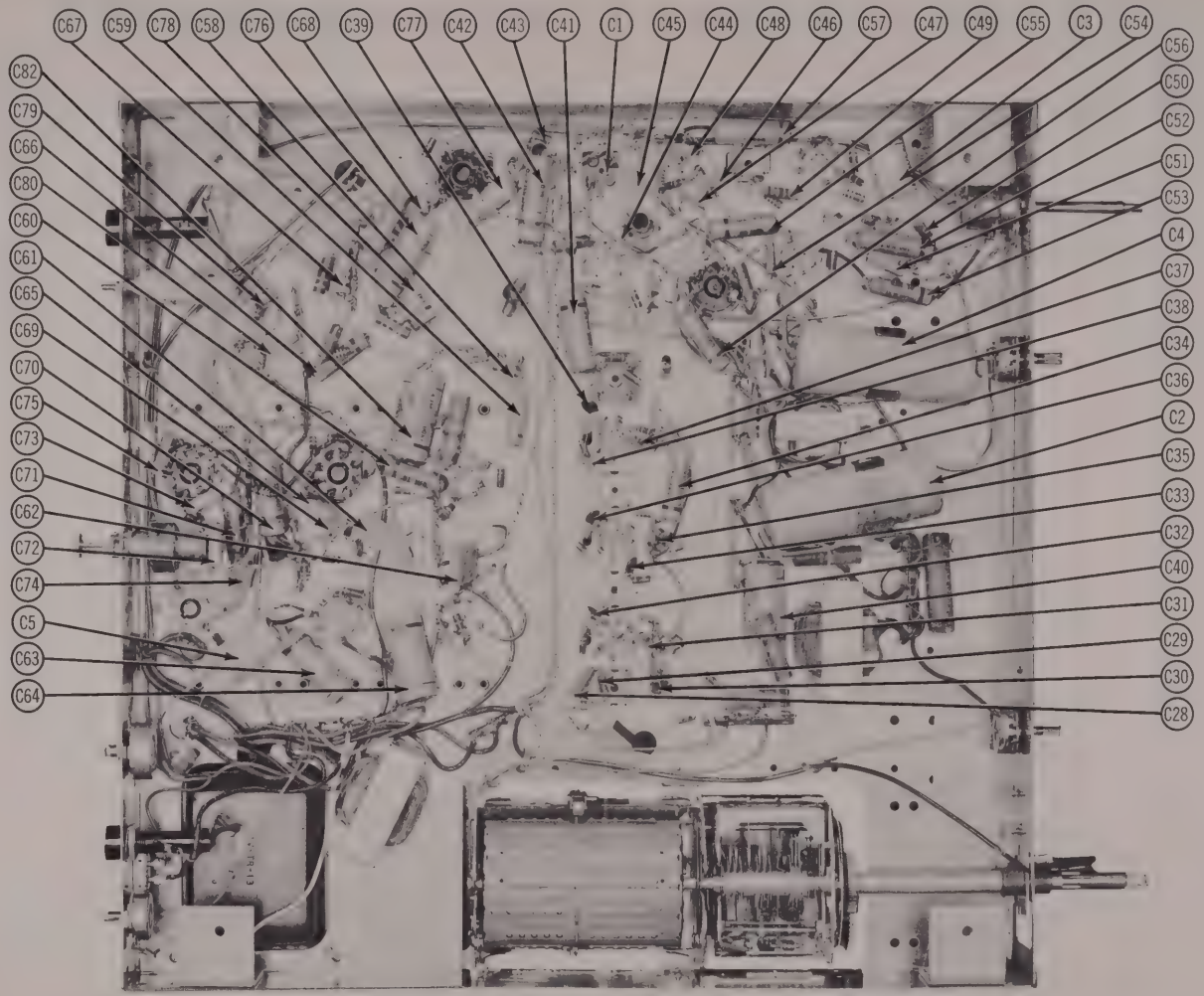
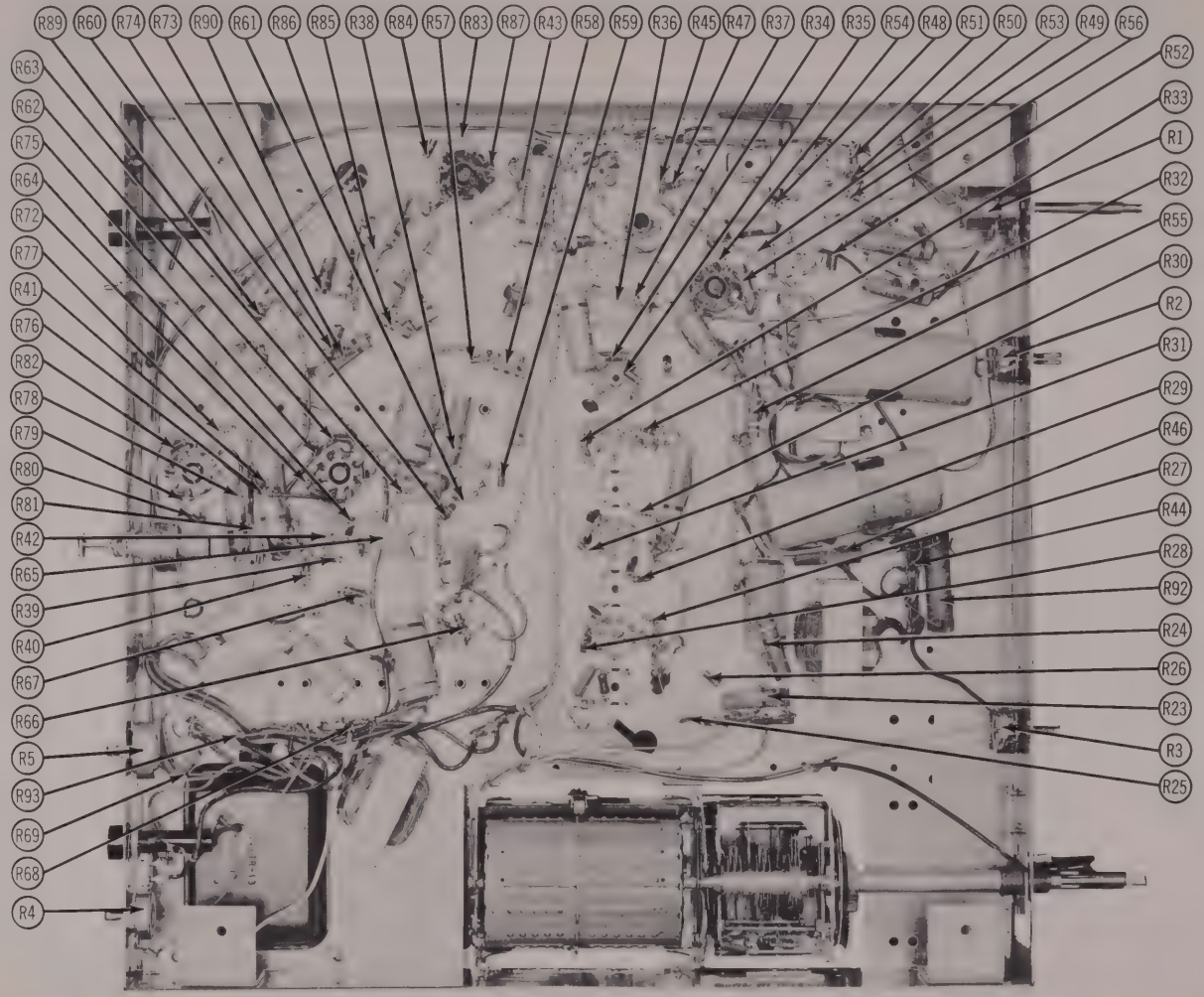
TRAV-LER MODELS 517-82U, 521-79U, -80U, -81U, -R90U, -R91U, 5210-60U, -61U (Ch. 417E4, 417E5, 417G5)



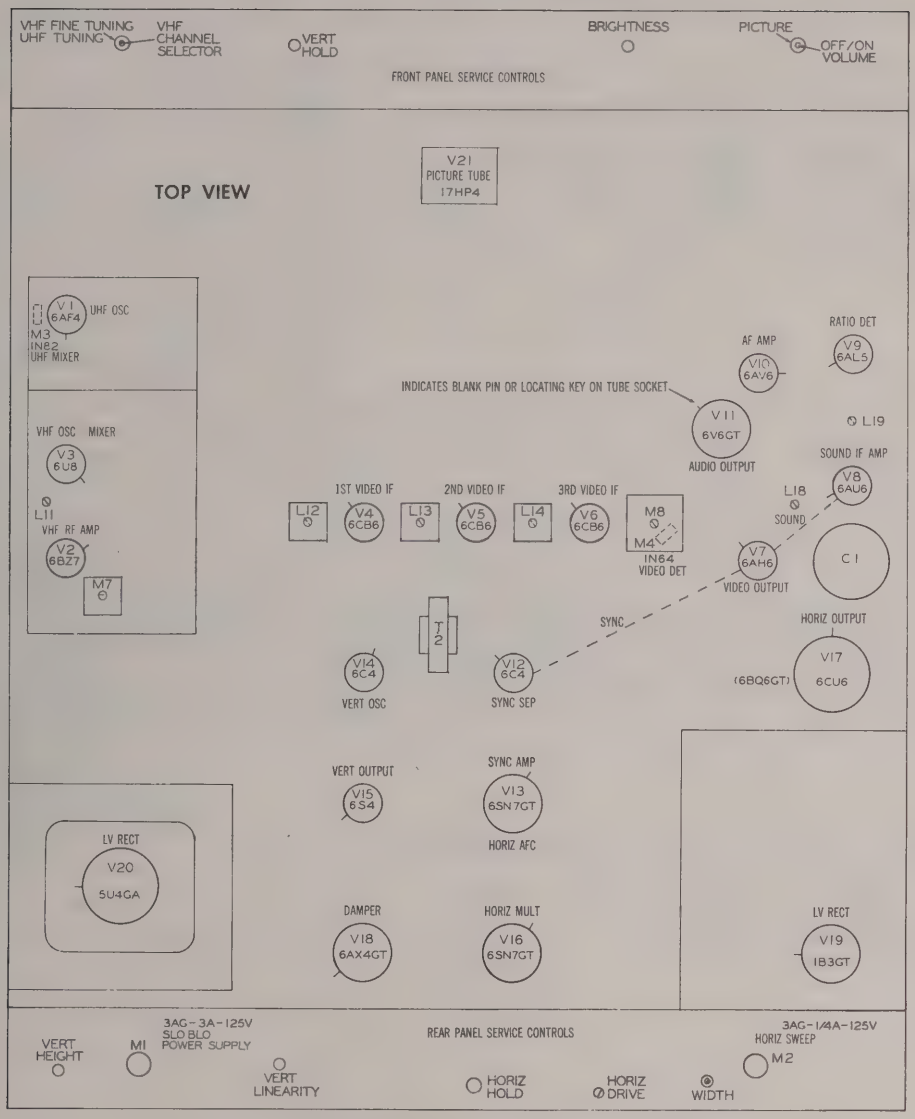
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

TRAV-LER MODELS 517-82U, 521-79U, -80U, -81U, -82OU, -82IU, 5210-60U, -61U (CH. 4174, 4175, 4176)

TUBE PLACEMENT CHART



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TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V20, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V7, V11, (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V7, V21
Has pic, no sound - V8, V9, V10, V11

SYNC FAILURE
No vert. sync - V13, V14
No horiz. sync - V13, V16
No vert. or horiz. sync - V12, V13

SWEEP FAILURE
No raster, has sound - V16, V17, V18, V19, V21, Fuse (M2)
No vertical deflection - V14, V15
Poor vert. linearity or foldover - V14, V15
Poor horiz. linearity or foldover - V16, V17, V18
Narrow picture - V16, V17, V18, V19, V20
Vert. off freq. - V13, V14
Horiz. off freq. - V13, V16

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis. Do not remove the horizontal multivibrator tube (V16) to disable the high voltage.

VIDEO IF ALIGNMENT

Connect the negative lead of a 1.5 volt battery to the ungrounded side of C34. Connect the positive lead to chassis.
Set the channel selector between any two VHF channels. This will disable the local oscillator and reduce the possibility of erroneous indications.
Use only enough sweep and marker generator output for useable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube. Low side to chassis.	44MC (10MC Swp)	41.25MC 47.25MC	Set between any two channels	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A1, A2	Adjust A1 (41.25MC) and A2 (47.25MC) to place 41.25MC and 47.25MC markers in trap notches as in Fig. 1. Use high scope gain and increase sweep generator output to observe trap notches.
2.	"	"	"	42.25MC 44.0MC 45.75MC	"	"	A3, A4, A5, A6, A7	Adjust A3 thru A7 for response curve similar to Fig. 1. A3 affects the low frequency side of response curve. A4 affects the high frequency side of response curve. A5 and A6 should be adjusted for proper symmetry, flatness and band width. A7 affects tilt.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
3.	Direct	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (B). Common to chassis.	A8, A9	Adjust for maximum deflection.
4.	"	"	"	"	DC probe to point (C). Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
3.	Direct	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point (B). Common to chassis.	A8, A9	Disconnect stabilizing capacitor (C3). Adjust for curve of maximum amplitude and symmetry similar to Fig. 2.
4.	"	"	"	"	"	"	A10	Reconnect C3. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 3. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

Set the picture control (R1A) for maximum contrast.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
5.	Direct	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru detector (Fig. 4) to pin 11 (cathode) of picture tube. Common to chassis.	A11	Adjust for MINIMUM deflection.

FIG. 1

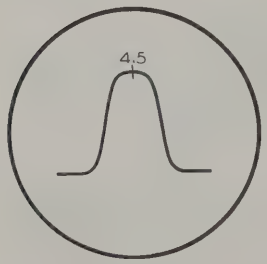


FIG. 2

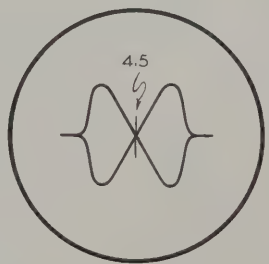


FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

VHF OSCILLATOR ALIGNMENT

Connect the negative lead of a 3 volt bias battery to the ungrounded side of C34. Connect the positive lead to chassis. The channel oscillator adjustment screws are reached through a hole just above and to the left of the channel switch shaft (hole extends through UHF Tuner). The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A12	Adjust to place sound marker in trap notch as in Fig. 5. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A13	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A14	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A15	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A16	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A17	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A18	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A19	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A20	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A21	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A22	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A23	

VHF RF AND MIXER ALIGNMENT

This portion of the VHF tuner has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

IF WAVE TRAP ADJUSTMENT

The IF wave trap should be tuned to minimize interference caused by signals which fall within the video IF bandpass (40-48MC). Tune in a station on which the interference is noted and adjust A24 for MINIMUM interference in the picture.

UHF TUNER ALIGNMENT

The UHF portion of this tuner has been properly aligned at the factory and is very stable. Alignment of this portion is not recommended in the field.

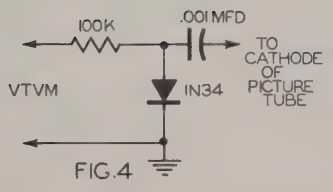


FIG.4

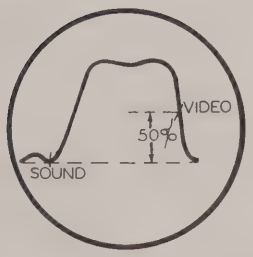
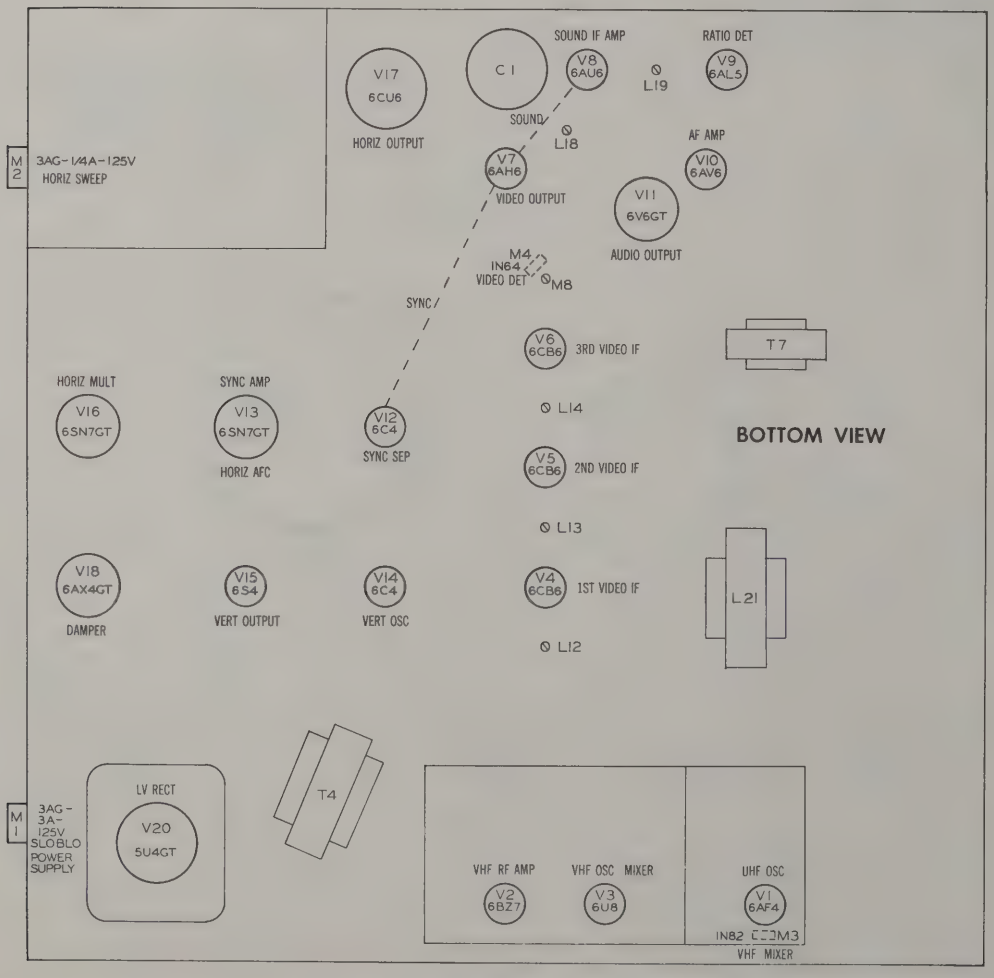


FIG.5

RESISTANCE MEASUREMENTS

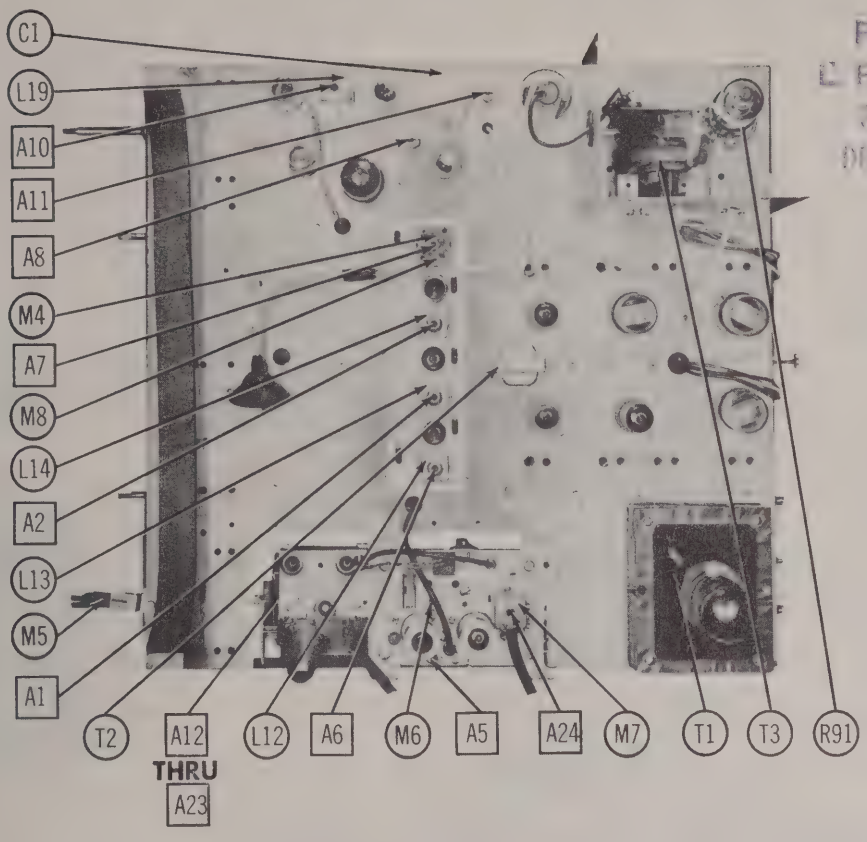
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	*■5.3KΩ	10KΩ	.1Ω	0Ω	0Ω	10KΩ	*■5.3KΩ		
V 2	6BZ7	†11KΩ	340KΩ	INF	0Ω	.1Ω	INF	1Meg	0Ω	†11KΩ
V 3	6U8	■4.3KΩ	200KΩ	†115KΩ	.1Ω	0Ω	†18KΩ	0Ω	0Ω	10KΩ
V 4	6CB6	1Meg	47Ω	0Ω	.1Ω	■470Ω	■470Ω	0Ω		
V 5	6CB6	1Meg	47Ω	0Ω	.1Ω	■470Ω	■470Ω	0Ω		
V 6	6CB6	.2Ω	150Ω	0Ω	.1Ω	■470Ω	■470Ω	0Ω		
V 7	6AH6	470KΩ	0Ω	0Ω	.1Ω	†5.2KΩ	25KΩ	300Ω		
V 8	6AU6	■68KΩ	25KΩ	25KΩ	25KΩ	†12.5KΩ	†12.5KΩ	■68Ω		
V 9	6AL5	INF	INF	0Ω	.1Ω	6.8KΩ	0Ω	6.8KΩ		
V 10	6AV6	2.2Meg	0Ω	.1Ω	0Ω	NC	NC	■470KΩ		
V 11	6V6GT	NC	25KΩ	†1.3KΩ	†1KΩ	500KΩ	TP	25KΩ	25KΩ	
V 12	6C4	†110KΩ	NC	0Ω	.1Ω	†110KΩ	2.2Meg	0Ω		
V 13	6SN7GT	1Meg	†6.1KΩ	2.7KΩ	200KΩ	33KΩ	100KΩ	0Ω	.1Ω	
V 14	6C4	†1.5Meg	TP	0Ω	.1Ω	†1.5Meg	1.8Meg	0Ω		
V 15	6S4	NC	800Ω	1Meg	0Ω	.1Ω	1Meg	NC	NC	†1.4KΩ
V 16	6SN7GT	300KΩ	†6.1KΩ	1.5KΩ	100KΩ	†160KΩ	1.5KΩ	0Ω	.1Ω	
V 17	6CU6	NC	.1Ω	NC	†50KΩ	470KΩ	TP	0Ω	47Ω	TOP CAP ▲8Ω
V 18	6AX4GT	NC	NC	INF	NC	†600Ω	NC	INF	INF	
V 19	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲368Ω
V 20	5U4GA	INF	50KΩ	INF	49Ω	INF	53Ω	INF	50KΩ	
V 21	17HP4	0Ω	2.2KΩ	PIN 6 †600Ω	PIN 10 †100KΩ	PIN 11 †200KΩ	PIN 12 .1Ω			

*MEASURED IN "UHF" POSITION.
■MEASURED FROM 115V LINE.
†MEASURED FROM PIN 2 OF V20.
▲MEASURED FROM PIN 3 OF V18.

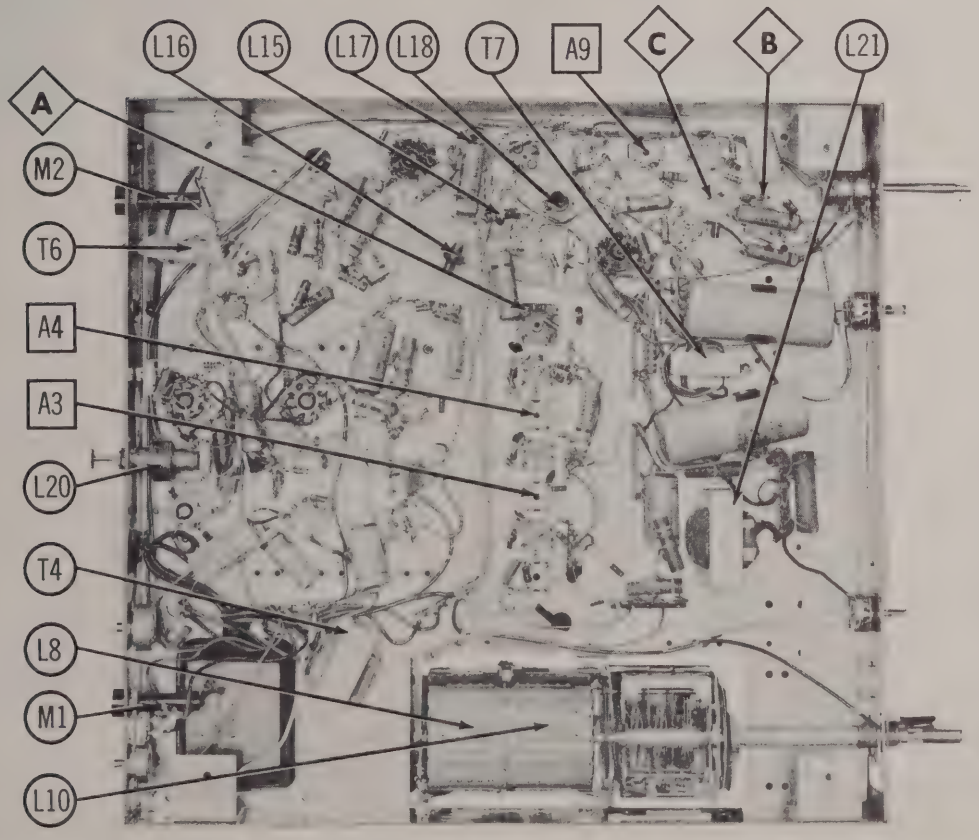


TUBE PLACEMENT CHART

PROPERTY OF
L. F. BLAN[illegible]
[illegible] ST.
DENVER, COLORADO



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: TRAV-LER PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	UHF Osc.	6AF4	6AF4	7DK	
V2	RF Amp.	6BZ7	6BZ7	9AJ	
V3	Mixer-Osc.	6U8	6U8	9AE	
V4	1st Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Output	6AH6	6AH6	7BK	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Det.	6AL5	6AL5	6BT	
V10	AF Amp.	6AV6	6AV6	7BT	
V11	Audio Output	6V6GT	6V6GT	7AC	
V12	Sync Sep.	6C4	6V4	6BG	
V13	Sync Amp.-Horiz. AFC	6SN7GT	6SN7GT	6BD	
V14	Vert. Osc.	6C4	6C4	6BG	
V15	Vert. Output	6B4	6B4	8AC	
V16	Horiz. Mult.	6SN7GT	6SN7GT	6BD	
V17	Horiz. Output	6CU6	6CU6	8AM	6BQ6GT used as an alternate.
V18	Damper	6AX4GT	6AX4GT	4CG	
V19	HV Rect.	1B3GT	1B3GT	3C	
V20	LV Rect.	5U4GA	5U4GA	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: TRAV-LER PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V21	17HP4	17HP4, 17RP4	17RP4, 17HP4	17HP4 17HP4	17HP4, 17RP4	12L	1 Aluminized 2 Silver Screen
		17HP4B 1		17HP4B 2		12L	
	21AUP4A ①	21AUP4A ①		21AUP4A ② 21AUP4A ①	21AUP4A ①	13L 13L	
				②			
		21ALP4		21AUP4	21AUP4	12L	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	VOLT.	REPLACEMENT DATA: TRAV-LER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1A	⌀40	450	TY-EC-48	FP238	TM-D40-450	D-325	
B	⌀40	450					
C2A	30	450	TY-EC-35	TCD2303	TD-30- 450	D-415	
B	50	300			TD-50-350		
C3	10	50	TY-EC-30	TC32	TD-10-50	FM-0510	
C4A	40	450	TY-EC-17	TCD2287	TD-40-450	FM-4540	
B	50	50			TD-50-50	FM-0550	
C5	100	25	TY-EC-27	TC2501	TD-100-25	MTH-2510	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No	RATING: CAP.	VOLT.	REPLACEMENT DATA: TRAV-LER PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C6	300						
C7	1000						
C8	5.6						
C9	100						
C10	30						
C11	1500		DD-152	501-001S	DC-5315		
C12	3-13						
C13	1500		DD-152	501-001S	DC-5315		
C14	3		TCZ-3R3	NPOA-030	ZT-553		
C15	.5-3		529-3	315-01-0R5	CT505A		
C16	47		DD-470	531-470	UC-5447		
C17	800						
C18	47		MFT-50				
C19	.5-3		529-3	315-01-0R5	CT555A		
C20	5						
C21	10		TCN-10	N750K-100	NT-541		
C22	800						
C23	320		DD-321	511-21L	UC-5322		
C24	68		TCN-68	N750L-680			
C25	800						
C26	800						
C27	1500		DD-152	501-001	DC-5315		
C28	150	500	DS-151	GP2K-151	MC236		
C29	100		DS-101	GP1K-101	UC-531		
C30	1000		DD-102	501-001	DC-521		
C31	1000		DS-102	GP2L-103	UC-532		
C32	1000		DD-102	501-001	DC-521		
C33	1000		DD-102	501-001	DC-521		
C34	.1	300	DF-104		PT401		
C35	1000		DS-102	GP2L-102	UC-531		
C36	1000		DD-102	501-001	DC-521		
C37	1000		DS-102	GP2L-102	UC-531		
C38	1000		DS-102	GP2L-102	UC-531		
C39	1000		DD-102	501-001	DC-521		
C40	.35	600			PT402S		
C41	.25	300			PT403S		
C42	.1	600	DF-104		PT401		
C43	10		DS-100	GP1K-100	UC-541		
C44	.1						
C45	33		TCN-33	N750K-330			
C46	5000		DD-502	511-005	DC-525		
C47	5000		DD-502	511-005	DC-525		
C48	5000		DD-502	511-005	DC-525		
C49	1000		DS-102	GP2L-103	UC-521		
C50	47		DS-470	GP1K-470	UC-5447		
C51	2200	500	DS-222	GP2-333-222	UC-5222		
C52	.05	400	DF-503		PT415		
C53	.01	600	DS-103	GP3-333-103	PT811		
C54	100	500	DS-101	GP1K-101	MC235		
C55	.02	600	DF-203	517-02	PT812		
C56	.005	600	DS-502	GP2-333-502	PT825		
C57	.033	600	DF-353		PT813		Note 1
C58	220	500	DS-221	GP2K-221	MC240		
C59	.005	600	DS-502	GP2-333-502	PT825		
C60	.01	600	DS-103	GP3-333-103	PT811		

CAPACITORS (cont)

ITEM No.	RATING: CAP.	VOLT.	REPLACEMENT DATA: TRAV-LER PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C61A	2000		*TY-CC-26	4PC-100	461403-01	DC-522	
B	5000					DC-523	
C	5000					DC-525	
C62	4700	500				MCB465	
C63	.1	600		DF-104		PT801	
C64	.25	600				PT802S	
C65	1000	500					
C66	.01	600		D6-103	GP3-333-103	PT811	
C67	.01	600		D6-103	GP3-333-103	PT811	
C68	.01	600		D6-103	GP3-333-103	PT811	
C69	680	500		D6-681	GP3K-681	UC-5355	
C70	.25	300				PT402S	
C71	.03	600		DF-303	517-03	PT812	
C72	3900	500				MCB463	
C73	390	500		D6-391	511-391	MCB245	
C74	470	500		D6-471	511-471	MCB245	
C75	470	500		D6-471	511-471	MC245	
C76	.1	600		DF-104		PT801	
C77	.05	400		DF-503		PT415	
C78	.1	600		DF-104		PT801	
C79	77	1500		DD30-470	1R5KV-470	DC30447	
C80	330	500		D6-331	GP2K-231	UC-5332	
C81	47	1000		DD30-470	3KV-470	DC30447	
C82	.25	600				PT802S	

Note 1. Some versions use .02MFD in this application.
* Items C61A, C61B, C61C, R55A, R65B and R65C are combined in one unit.

CONTROLS

ITEM No	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: TRAV-LER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1000Ω	1	VC-80	F1-4		QJ-258*	UF12L	Picture (Panel)
B	1Meg	1		R2-53			UR18A	Volume (Rear) Attach to R1A
C	Switch			KB-1			U6-26	Attach to R1B.
R2A	100kΩ	1	VC-62	AB-40	A47-100K-S	Q11-138	TA15L	Brightness
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R2A
R3A	1.5Meg	1	VC-63	AB-742	A47-1.5Meg-S	Q11-136	TA15L	Vertical Hold
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R3A.
R4A	2.5Meg	1	VC-59	BX-39	A47-2.5Meg-S	Q11-139	TA25L	Height
B	Shaft		Not Req.	AK-4	FS3-1/4	Not Req.	Not Req.	Attach to R4A.
R5A	5000Ω	2	VK-29	VK-135	A43-5000	WK-5000	R5000L	Vertical Linearity (Wire Wound)
B	Shaft		Not Req.	Not Req.	FS3-1/4	Not Req.	Not Req.	Attach to R5A.

*CONCENTRIKIT EQUIVALENT; K-2 KIT, BASE ELEMENTS AND SHAFTS; B11-108, P1-204 (Panel) B13-137, R2-216 (Rear) T8-1 (Switch)

RESISTORS

ITEM No.	RATING: OHMS	WATTS	REPLACEMENT DATA: TRAV-LER PART No.	IRC PART No.	NOTES
R6	10kΩ	1		BTS-3000	
R7	1000Ω	1		BTS-100	
R8	100Ω	1			
R9	22kΩ	1		BTA-1500	
R10	47kΩ	1			
R11	470kΩ	1		BTS-470K	
R12	820kΩ	1			
R13	1500Ω	1		BTA-1500	
R14	27kΩ	1			
R15	10kΩ	1			
R16	3300Ω	1		BTA-3300	
R17	100kΩ	1			
R18	6800Ω	1			
R19	100kΩ	1			
R20	100kΩ	1			
R21	100kΩ	1			
R22	820kΩ	1			
R23	4700Ω	2		BTH-4700	
R24	4700Ω	2		BTH-4700	
R25	10kΩ	1		BTS-1000	
R26	1000Ω	1		BTS-1000	
R27	470Ω	1		BTS-470	
R28	47Ω	1		BTS-47	
R29	1000Ω	1		BTS-1000	
R30	470Ω	1		BTS-470	
R31	47Ω	1		BTS-47	
R32	470Ω	1		BTS-470	
R33	150Ω	1		BTS-150	
R34	8200Ω	1			Note 1
R35	56kΩ	1			
R36	470kΩ	1		BTS-470	
R37	56Ω	1		BTS-56	
R38	4700Ω	2		BTH-4700	
R39	2200Ω	1			
R40	4700Ω	1			
R41	100kΩ	1			
R42	470kΩ	1		BTS-470K	
R43	68kΩ	1			
R44	220kΩ	1			
R45	68kΩ	1		BTS-68K	
R46	12kΩ	2		BTS-12K	
R47	8Ω	1		BTS-8	
R48	33kΩ	1		BTS-33K	
R49	470Ω	1		BTS-470	
R50	6800Ω	1		BTS-6800	

ITEM No.	RATING: OHMS	WATTS	REPLACEMENT DATA: TRAV-LER PART No.	IRC PART No.	NOTES
R51	6800Ω	1		BTS-6800	
R52	2.5Meg	1		BTS-2.5Meg	
R53	470kΩ	1		BTS-470K	
R54	470kΩ	1		BTS-470K	
R55	39Ω	1		BTA-390	
R56	220Ω	1		BTA-220	
R57	22kΩ	1			
R58	470kΩ	1		BTS-470K	
R59	2.5Meg	1			
R60	680kΩ	1			
R61	47kΩ	1		BTS-47K	
R62	1Meg	1			
R63	5600Ω	1			
R64	2700Ω	1			
R65A	22kΩ	1			
B	8200Ω	1	* TY-CE-26		
C	6300Ω	1			
R66	1.5Meg	1			
R67	1Meg	1			
R68	2200Ω	1			
R69	390Ω	1			
R70	560Ω	1			
R71	560Ω	1			
R72	100kΩ	2			
R73	33kΩ	2			
R74	6800Ω	1			
R75	100kΩ	1			
R76	100kΩ	1			
R77	33kΩ	1			
R78	5600Ω 5%	1		BTS-5600 5%	
R79	100kΩ	1			
R80	8200Ω	1			
R81	150kΩ	1		BTS-150K	
R82	1500Ω	1			
R83	470kΩ	1		BTS-470K	
R84	100Ω	1			
R85	33kΩ	2			
R86	18kΩ	1			
R87	47Ω	1			
R88	1000Ω	1			
R89	10kΩ	1			
R90	10kΩ	1			
R91	3.3Ω	½		BTS-3.3	
R92	500Ω	10		2D-500	
R93	220kΩ	1		BTS-220K	

Note 1. Some versions use a 56Ω0 1W resistor in this application.
* Items C61A, C61B, C61C, R55A, R65B, R65C are combined in one unit.

TRANSFORMER (POWER)

ITEM No	RATING: PRI.	SEC 1	SEC 2	REPLACEMENT DATA: TRAV-LER PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC	760VCT	5VAC	TY-TR-13						
	1.7A	.190ADC	3A							
	SEC 1	SEC 4	SEC 5							
	6.3VAC	6.3VAC	6.3VAC							
	2.75A	1.2A	6.9A							

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA: TRAV-LER PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	TV-TR-10	B6702	A-3003	209T1 ①	V40S	A-8125	26A03	A-97X
T3	Horiz. Output Trans.		PB415 ① *	HVO-2-1 *		X07S ① *	A-8232 ① *	26B52 ① *	D-19 ① *
T4	Vert. Output Trans.	TV-TR-8	Z1B04	A-3037	222T1	V31S	A-8123	26B52	A-103X
T5A	Yoke Horiz. (10MH)	TV-L-52	D7601 ② ③	MDF-70 ② ③	207D1 ② ③	Y30F60-43 ② ③	DY-2A ② ③	Y-6 ② ③	Y-21 ② ③
B	Vert. (36MH)								
T6	Width Coil, 5 to 4.6MH			MWC-2 ④	209R1 ④	20U85A ⑤	WC-12 ⑤	WC-17 ⑤	WC-12 ⑤

① Drill new mounting hole(s).
② Use original yoke rear cover and centering device.
③ Use original horizontal damping network.
④ Drill new mounting hole.
⑤ Do not use tap.
⑥ Connect to coded blue & green terminals.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
9	2	2		Red	2	Red	9
8	5 & 7	5 & 7		White & Blue	5 & 7	White & Blue	5 & 7
7	4	4		Grey	4	Brown	4
6	8	8		Green	8	Green	1
5	6	6		Yellow	6	Yellow	3
4	NC	NC		Black	NC	Black	NC

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE: PRI.	SEC	REPLACEMENT DATA: TRAV-LER PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T7	5.7kΩ	3.2Ω	TV-AT-11	Z1004	A-2990	A-3077	24S51	S-5X	

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V	C	IMP	REPLACEMENT DATA: TRAV-LER PART No.	QUAM PART No.	NOTES
SP1	5"	PM			3.2Ω	SPK-36	5A1	Tweeter used in chassis 417G5 only.

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	SEC.	REPLACEMENT DATA: TRAV-LER PART No.	MISSIMER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	UHF Ant. Coil	0Ω						
L2A	Fil. Choke	0Ω						
B	Fil. Choke	0Ω						
L3	Cathode Choke	0Ω						
L4	UHF Mixer Coil	0Ω						
L5	UHF Osc. Coupling Coil	0Ω						
L6	UHF IF Coil	0Ω						
L7	UHF IF Coil	0Ω						
L8A	UHF IF Strip	0Ω	0Ω					
B	VHF Ant. Coils	0Ω	0Ω					
L9	Mxr. Coil	0Ω						
L10	VHF RF, Mixer Grid, Osc. Coils	0Ω						
L11	Conv. Plate	0Ω						
L12	1st Video IF	.2Ω	4.4Ω	TV-L-47				
L13	2nd Video IF	.2Ω	.3Ω	TV-L-48	17-5002*	TV-137*	6332*	Includes 4L25MC Trap
L14	3rd Video IF	.2Ω	.3Ω	TV-L-48	17-5003*	TV-138*	6333*	Includes 4T.25MC Trap
L15	Series Peaking Coil	7.5Ω			19-4301▲	TV-186▲	6154▲	330 Microhenries; Wound on 10KΩ 1W resistor
L16	Shunt Peaking Coil	18Ω					6156	760 Microhenries
L17	4.5MC Trap	L.7Ω		TV-L-18B	20-1005	TV-151	1469	
L18	Sound IF	L.7Ω		TV-L-18A	17-3403	TV-151	1470	
L19	Ratio Det.	7.1Ω	1.6DCT	TV-L-17	17-3497	TV-152	6205	Tertiary Winding, 8Ω
L20	Horiz. Osc.	180Ω			19-1578▲	TV-169▲	6210▲	

* Use adaptor plate.
▲ Parallel with 10KΩ 1Watt resistor.
◆ Drill new mounting hole.

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (5 CURRENT 1000 ~)	REPLACEMENT DATA: TRAV-LER PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L21	190ADC	84.5Ω	2.62H	TV-FC-1	C-5030 ①	C-2991 ①	C-2325 ①	28C43	C-17X ①

① Drill one new mounting hole.

TRAV-LER MODELS 517-620, 521-790, -800, -810, 522-810, 523-840, -610 (Ch. 417Z4, 417Z5, 417Z6)

PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			TRAV-LER PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	3A 125V			313003 (3AG S/B 3A)	341001	MDX3	HKP
M2	3AG S/B	1/4A 125V			313.250 (3AG S/B 1/4A)	341001	MDL 1/4	HKP

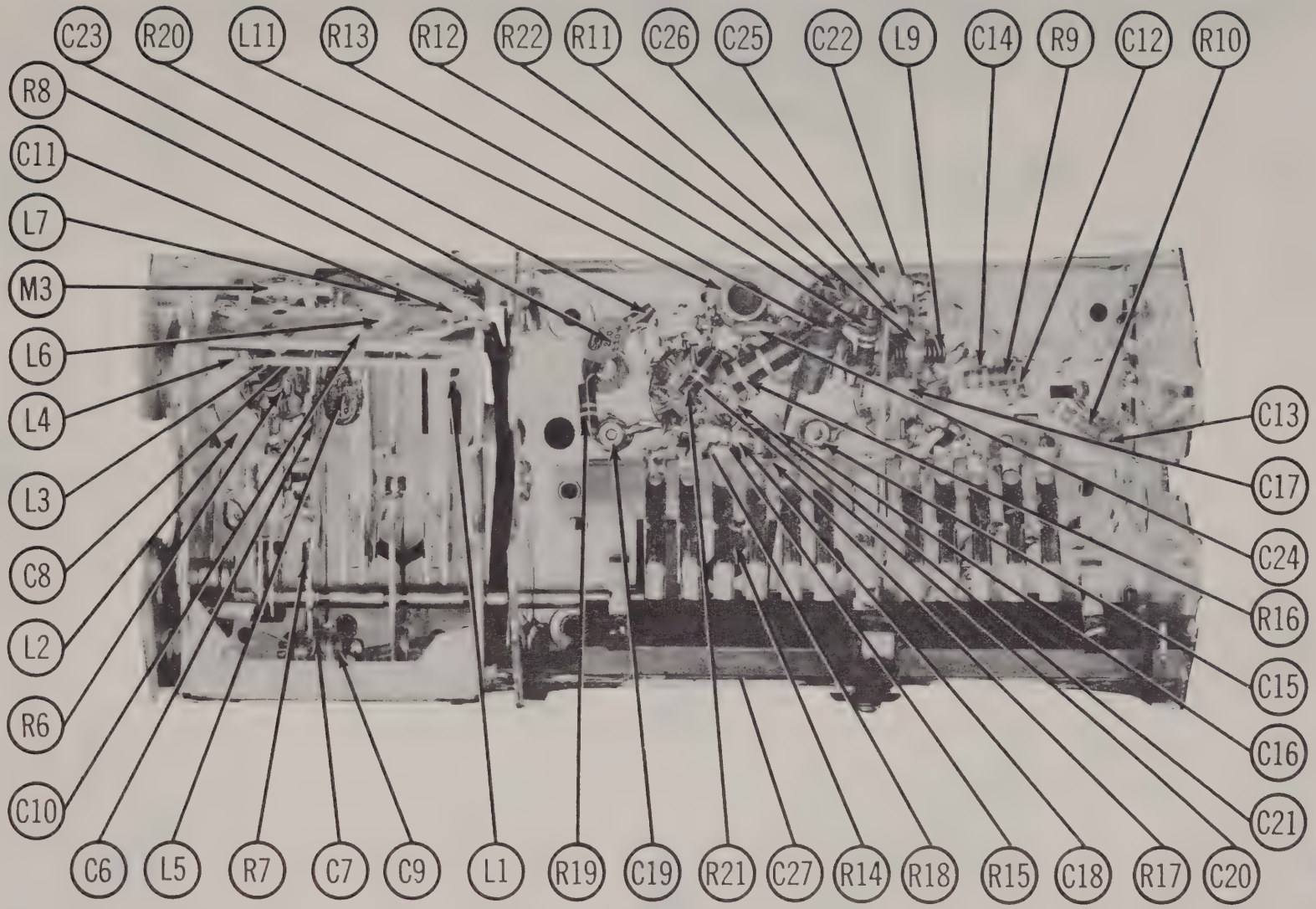
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		TRAV-LER PART No.	SYLVANIA PART No.	
M3	1N82A		1N82A	UHF Mixer
M4	CK706A*		1N60	Video Det.

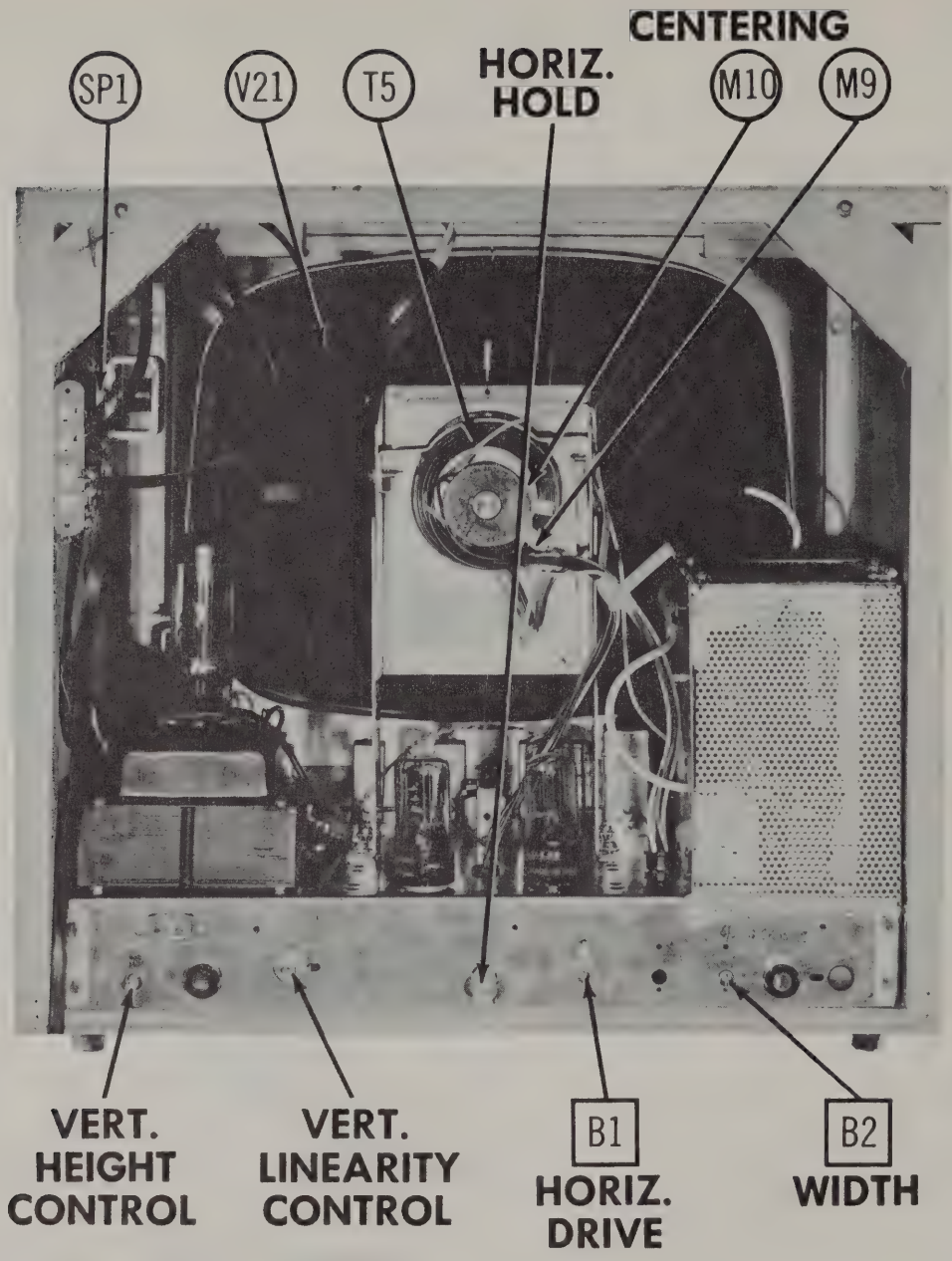
*Some versions may use type 1N64 crystal diode in this application.

MISCELLANEOUS

ITEM No.	PART NAME	TRAV-LER PART No.	NOTES
M5	Dial Light		#47
M6	Tuner	TA-17	VHF-UHF
M7	Trap		VHF Ant. Input Filter
M8	Video Det. Assy.	TV-L-50	Includes M4, Coils, & Capacitors
M9	Centering Device		Part of Deflection Yoke (T5) Rear Cover
M10	Ion Trap		
B1	Trimmer Cap.	TU-TC-11	Horiz. Drive (15-320MMF)



RF TUNER-BOTTOM VIEW



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern. Adjust the horizontal hold (L20) until the picture synchronizes horizontally. Switch off channel and back again. Picture should now be locked in sync. If not, slightly readjust L20.

Turn picture control (R1A) maximum counter clockwise and brightness control for maximum brightness. Turn the horizontal drive trimmer (B1) clockwise until white bars or compression near center of the raster appears. Then turn B1 counter clockwise until the white bars or compression disappears.

Adjust the horizontal width slug (B2) for a picture slightly wider than necessary to fill the picture mask horizontally.

DENVER, COLORADO

ULTRATONE
MODEL 355

ULTRATONE
MODEL 355

TRADE NAME	Ultratone Model 355
MANUFACTURER	Audio Industries, Michigan. City, Ind.
TYPE SET	AC Operated Radio-Phono Combination Superheterodyne Receiver
TUBES (Five)	Types: 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det. -AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles
RATING	.24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~ Mod.)	Tuning Gang fully open.	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1600KC	"	"	A5	"
3.		Loop	1400KC	Tune to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT-SEEV-M MODEL 954B- PHOTOFACT SET 302 - FOLDER 12.

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PARTS LIST AND DESCRIPTIONS

ULTRATONE
Model 355

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ULTRATONE PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det. -AVC-AF Amp.	12AT6	12AT6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rect.	35W4	35W4	5BQ	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	ULTRATONE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	40	150			CDBQ-1001		Red
B	40	150					Red
C	20	150					Blue
D	20	25					Yellow

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	ULTRATONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	.1	200		DF-104		PT401	
C3	5000			DD-502	811-005	DC525	
C4	.1	200		DF-104		PT401	
C5	.05	200		DF-503		PT415	
C6A	220						
B	5000						
C	5000			♦PC-151	♦1408-02		
D	250						
E							
C7	5000			DD-502	811-005	DC525	
C8	10000			DD-103	811-01	DC511	
C9	.1	200		DF-104		PT401	

♦ Items C6A, C6B, C6C, C6D, C6E, R12A, R12B, and R12C are combined in one unit. When replacing items separately, C6D and C6E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ULTRATONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	2.2Meg	½	412A	AB-76				Volume
B	Shaft		Not Req.	AK-4				Attach to R1A.
C	Switch		Not Req.	KB-1				Attach to R1A.
R2	500K	½	409					Tone & Switch

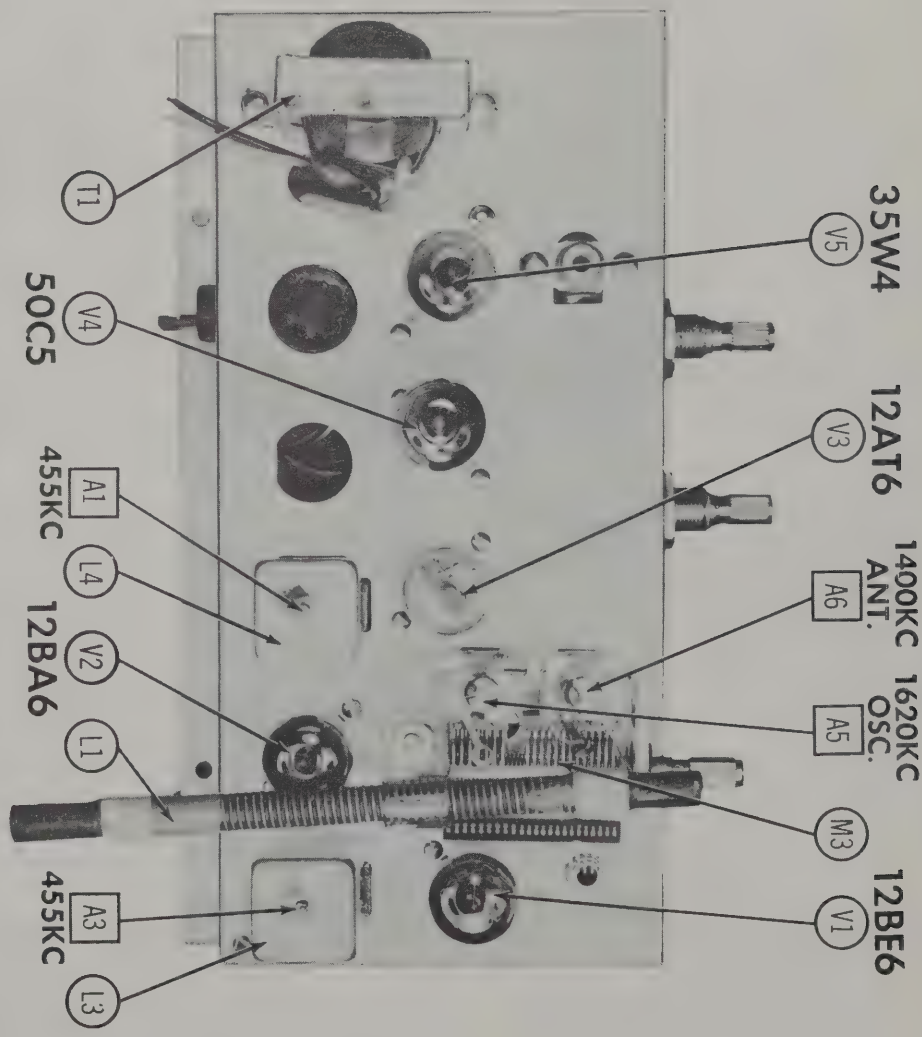
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ULTRATONE PART No.	IRC PART No.	
R3	22KΩ	½		BTS-22K	
R4	150Ω	½		BTS-150	
R5	47KΩ	½		BTS-47K	
R6	2.2Meg	½		BTS-2.2Meg	
R7	470KΩ	½		BTS-470K	
R8	270KΩ	½		BTS-270K	
R9	4500Ω	½		BTS-4700	
R10	2.2Meg	½		BTS-2.2Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ULTRATONE PART No.	IRC PART No.	
R11	10KΩ	½		BTS-10K	
R12A	6.8Meg	½		BTS-6.8Meg	
B	470KΩ	½	♦	BTS-470K	
C	470KΩ	½		BTS-470K	
R13	150Ω	½		BTS-150	
R14	30Ω	½		BTS-33	
R15	250Ω	2			
R16	1000Ω	1		BTA-1000	

♦ Items C6A, C6B, C6C, C6D, C6E, R12A, R12B, R12C are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: ULTRATONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2.4KΩ	3.4Ω	1209B	Z1101	A-3025	A-3332	26S58 ①	S-12X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA: ULTRATONE PART No.	QUAM PART No.	NOTES
SP1	6"	PM	3.4Ω		6A1	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: ULTRATONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coil	.7Ω						
L2	Osc. Coil	7.5Ω						Tapped ② .8Ω
L3	Input IF	14Ω	16Ω	1405	16-6758	BC-352	12-C1	
L4	Output IF	14Ω	16Ω	1406-A	16-6770	BC-355	12-C6	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: ULTRATONE PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	REMARKS
M1				46-T	0-1 or S-1 and 0-3	

ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

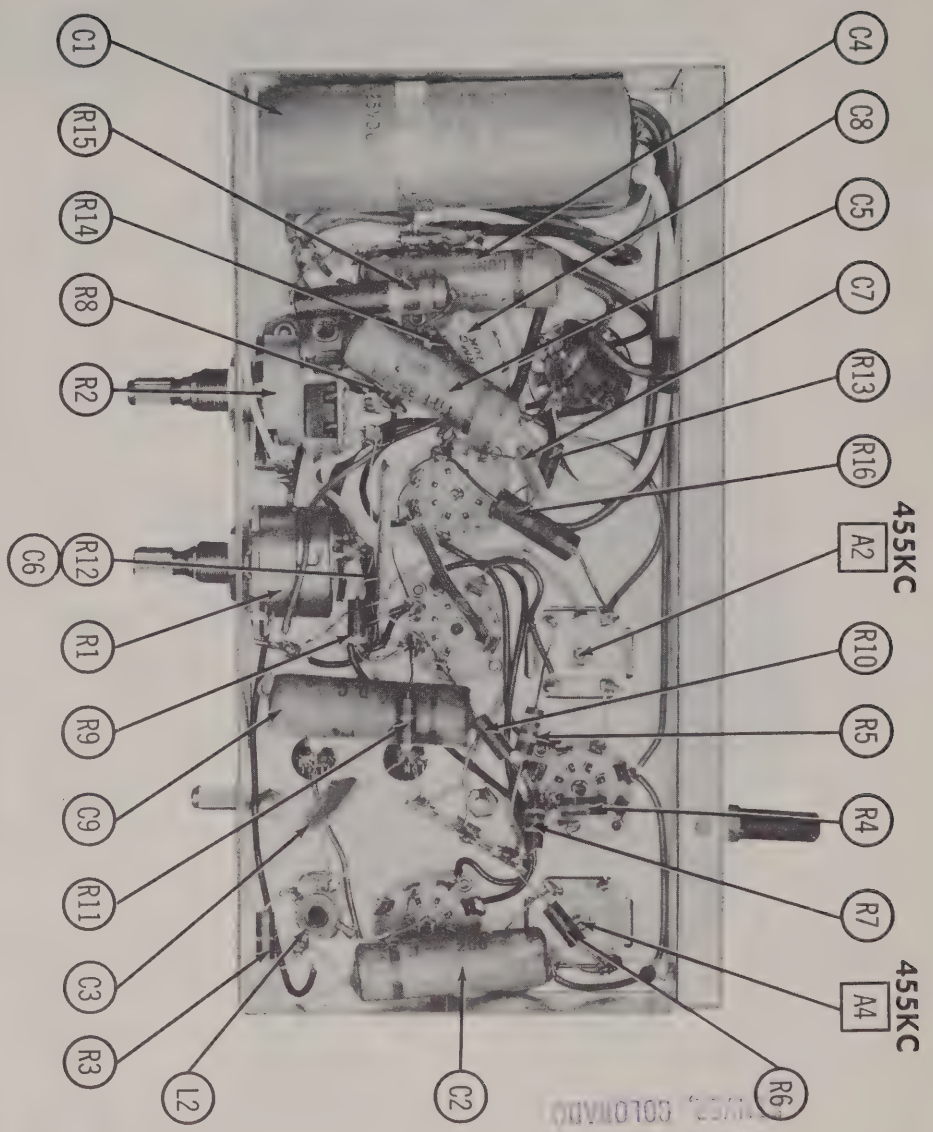
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA: ULTRATONE PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M2	78RPM Needle	†CR-55 or ♦CR-55D	†C-449 or ♦C-449D	†W-64S or ♦W-64D	† Jewel ♦ Diamond
	33 1/3-45RPM Needle	†CR-55LP or ♦CR-55LPD	†A-448 or ♦A-448D	†W-64MGS or ♦W-64MGD	

MISCELLANEOUS

ITEM No.	PART NAME	ULTRATONE PART No.	NOTES
M3	Tuning Cap.	1017	2 Gang (34-405MMF; 10-100MMF)

CHASSIS—BOTTOM VIEW



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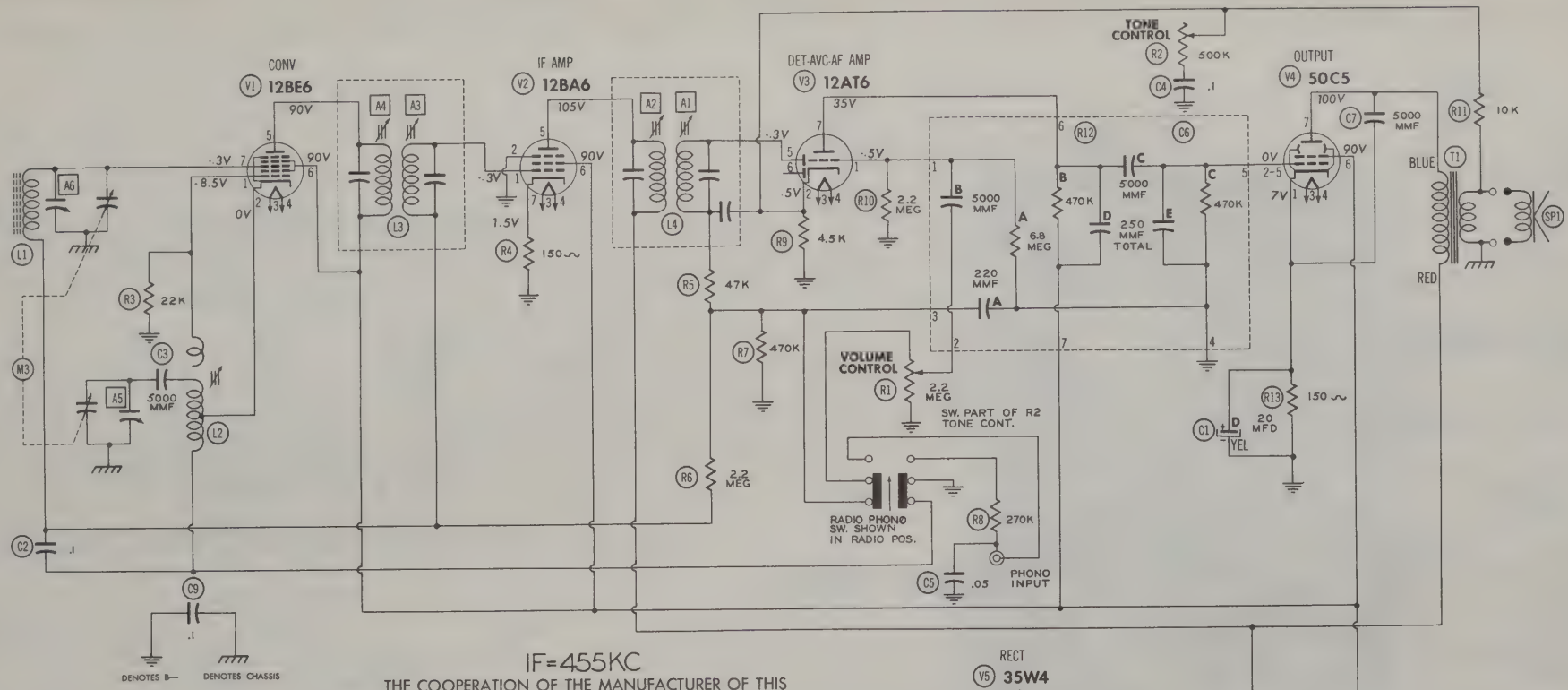
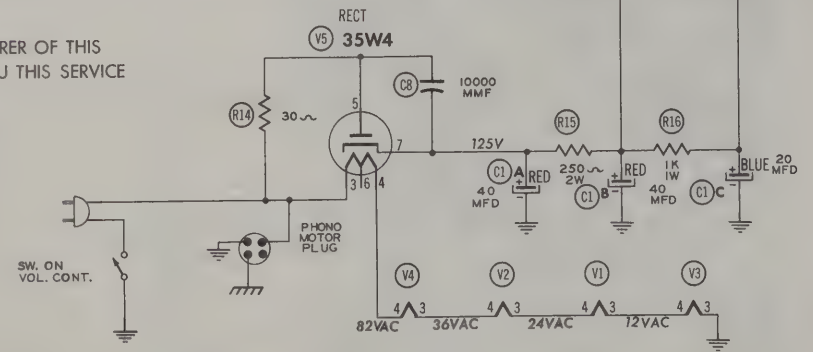
DENVER, COLORADO



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.7Ω	12Ω	25Ω	†1.2KΩ	†1.2KΩ	2.4Meg
V 2	12BA6	2.4Meg	0Ω	25Ω	37Ω	†250Ω	†1.2KΩ	150Ω
V 3	12AT6	2.2Meg	4.5KΩ	0Ω	12Ω	517KΩ	NC	†471KΩ
V 4	50C5	150Ω	470KΩ	37Ω	87Ω	470KΩ	†1.2KΩ	†490Ω
V 5	35W4	NC	NC	123Ω	87Ω	152Ω	97Ω	200KΩ

†MEASURED FROM PIN 7 OF V5.
NC-NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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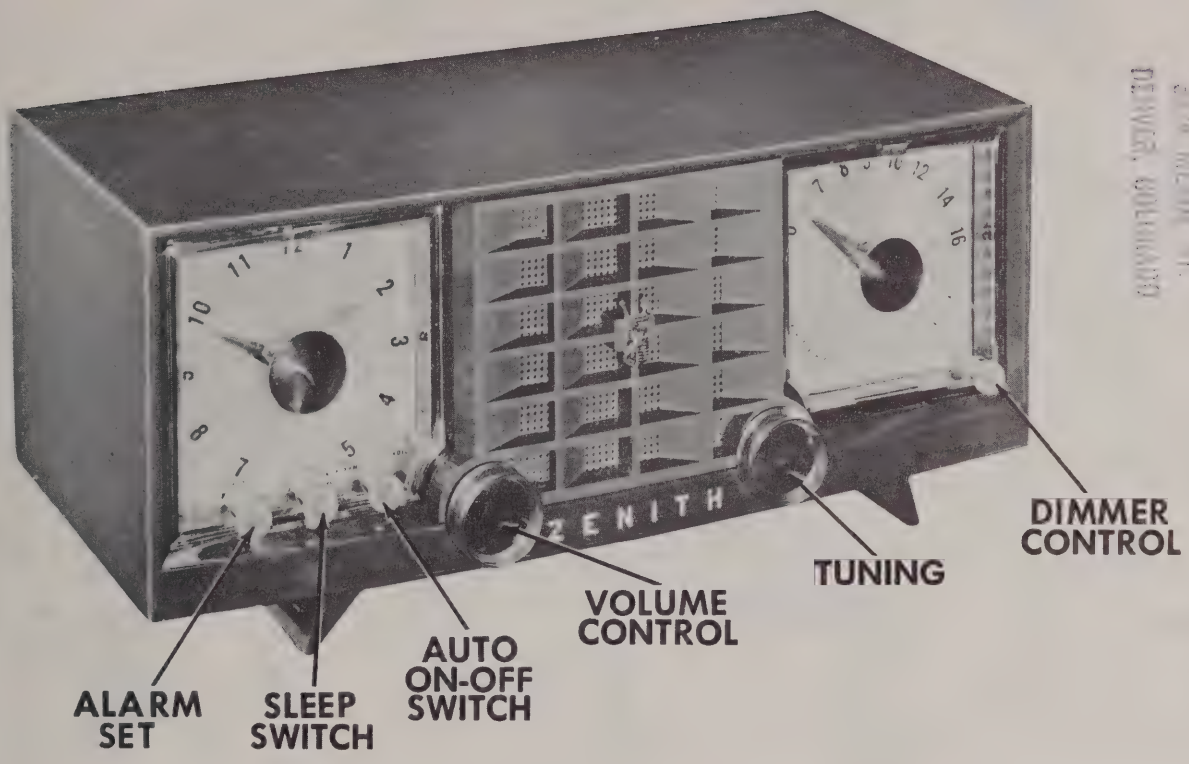
ZENITH MODELS T521F, G, R, W, Y (Ch. 5T03)



ZENITH MODELS T521F, G, R, W, Y (Ch. 5T03)

TRADE NAME	Zenith Models T521F, G, R, W, Y (Ch. 5T03)
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Ill.
TYPE SET	AC Operated AM Superheterodyne Receiver with Electric Clock
TUBES (Five)	Types: 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles
RATING	.24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.5MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to chassis.	455KC (400~ Mod.)	600KC	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1600KC	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	1400KC	"	A6	"

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PARTS LIST AND DESCRIPTIONS

ZENITH
MODEL T521F (Ch. 5T03)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ZENITH PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det. -AVC-AF Amp.	12AT6	12AT6	7BT	
V4	Output	50C5	50C5	7CV	
V5	Rect.	35W4	35W4	5BQ	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	ZENITH PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■80	150	22-2351	FP216	TM-8040-150	D-085	
B	▲40	150					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	ZENITH PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	.05	200	22-829	DF-503			
C3	250		22-1666	D6-251	GP2K-251	UC-5325	
C4	.05	200	22-829	DF-503		PT415	
C5	10000		22-3	DD-103	811-01	DC511	
C6	470		22-6	DD-471	811-471	UC-5347	
C7	10000		22-3	DD-103	811-01	DC511	
C8	.01	400	22-1846	D6-103	GP3-333-103	PT411	
C9	.05	200	22-829	DF-503		PT415	
C10	10000		22-3	DD-103	811-01	DC511	

CONTROLS

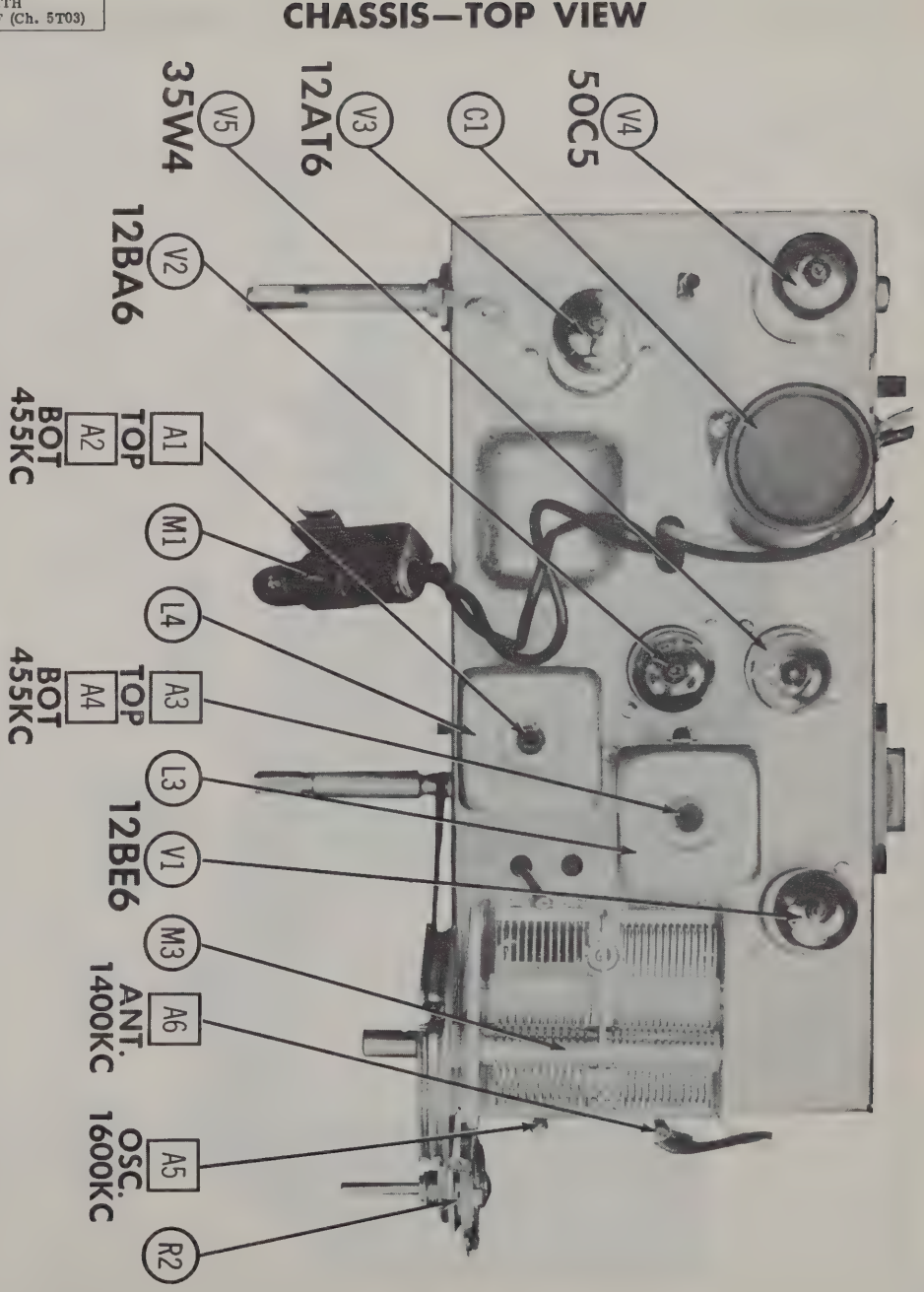
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500KΩ	½	63-2826	AB-617	A47-500K-Z	Q11-133	U-48	Volume
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R1A.
R2	3Ω	2	63-3219			W-5		Dimmer (Wire Wound)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R3	22KΩ	½	63-1842	BTS-22K	
R4	2.2Meg	½	63-1926	BTS-2.2Meg	
R5	68Ω	½	63-1737	BTS-68	
R6	47KΩ	½	63-1856	BTS-47K	
R7	4.7Meg	½	63-1940	BTS-4.7Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R8	470KΩ	½	63-1898	BTS-470K	
R9	470KΩ	½	63-1898	BTS-470K	
R10	150Ω	½	63-1750	BTS-150	
R11	1000Ω	1	63-956	BTA-1000	
R12	22Ω	1	63-3197	BTA-22	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.3KΩ	3.3Ω	95-1354	Z1102 ①	A-3031 ①	A-3330 ①	24S50A ①	S-16X	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ZENITH PART No.	QUAM PART No.	
SP1	4"	PM	3.3Ω	49-713	4A07	

COILS (RF-IF)

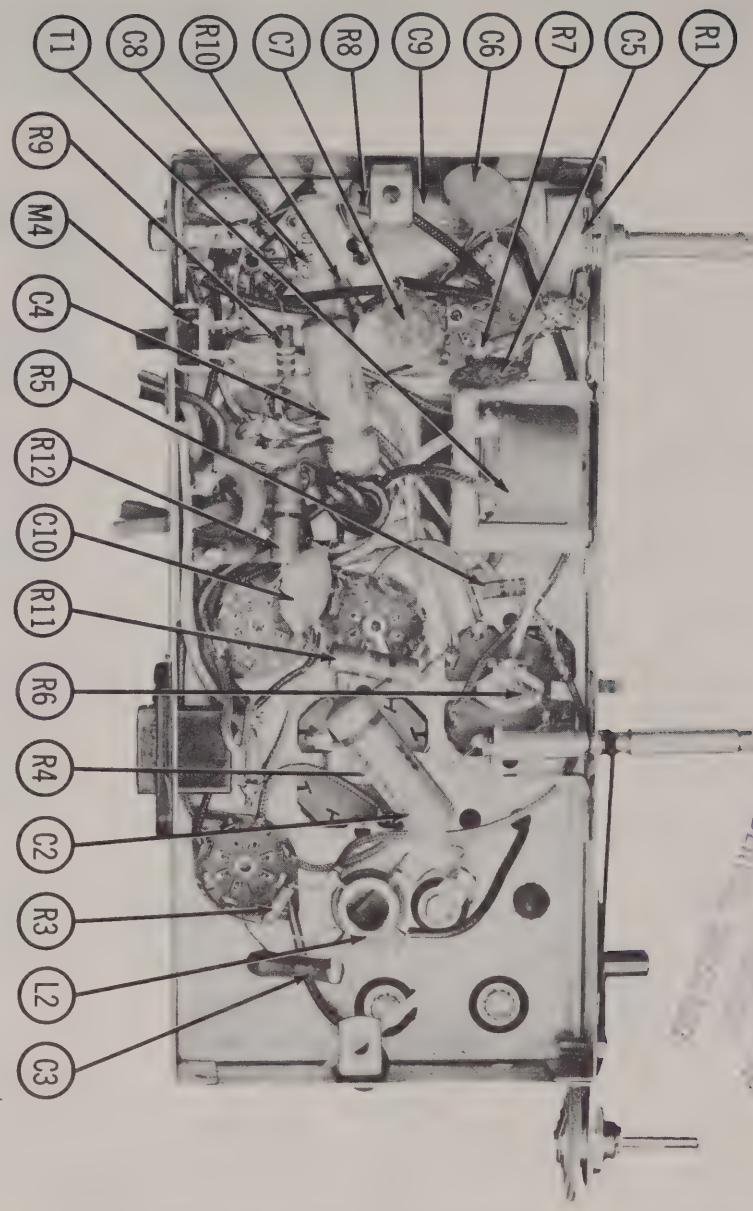
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3.4Ω		S-22230				Includes cabinet back.
L2	Osc. Coil	.7Ω	6.5Ω	S-22709	14-1074	BC-381	70-Osc.*	
L3	Input IF	16Ω	16Ω	95-1101	16-6666	BC-368	012-C1	
L4	Output IF	17Ω	17Ω	95-1102	16-6770■	BC-355■	12-C6■	

* Disregard tap on secondary.
■ Use adaptor plate & cut out center spade bolt mounting support.

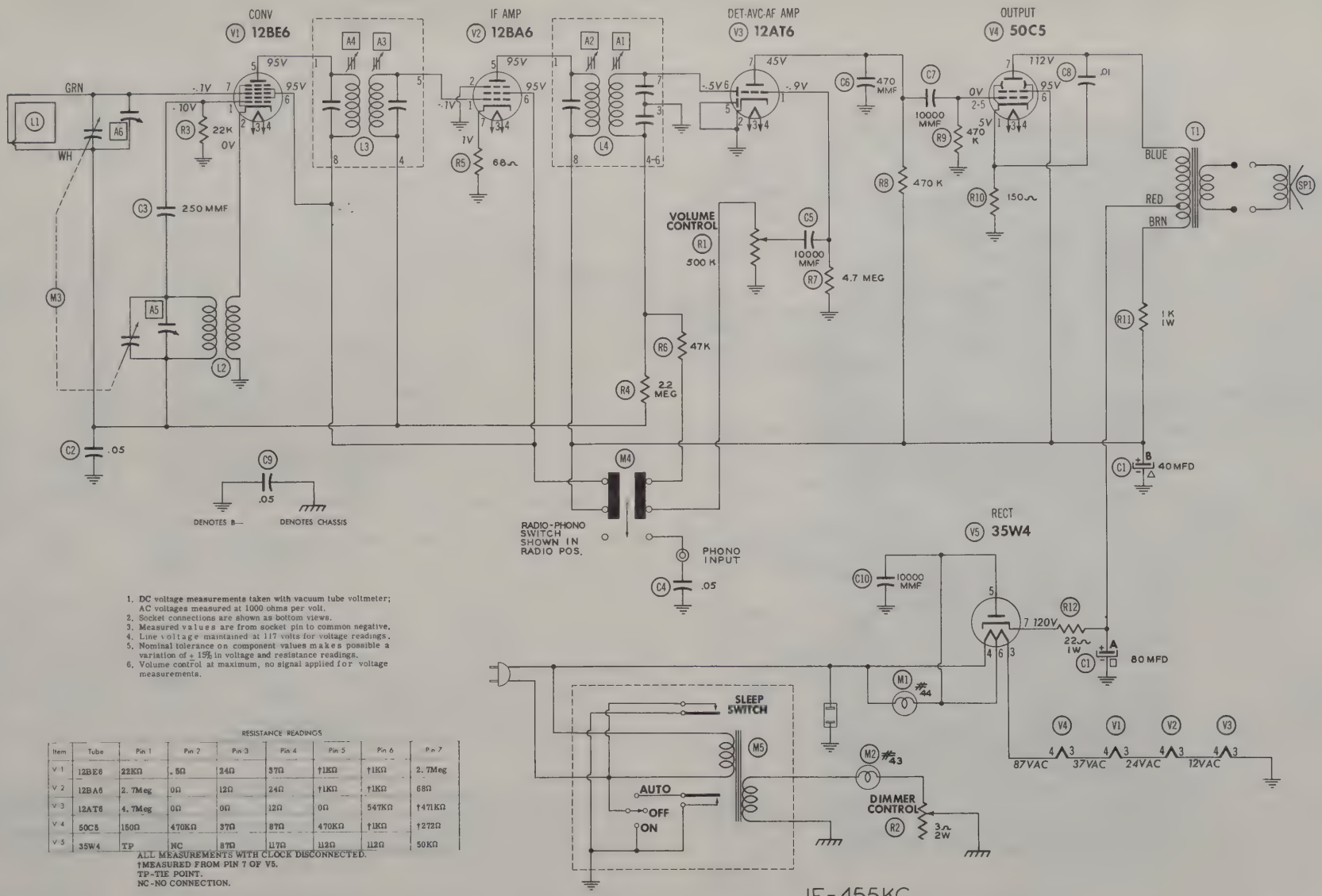
MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M1	Dial Light	100-67	Radio, #44
M2	Pilot Light	100-51	Clock, #43
M3	Tuning Cap.	22-2583	2 Gang (26-465MMF; 27-170MMF)
M4	Switch	85-495	Radio -Phono (DPDT-Slide Type)
M5	Clock Assy.	S-21664	
	Cabinet	14-1716	Model T521R
	Cabinet	14-1717	Model T521Y
	Cabinet	14-1718	Model T521G
	Cabinet	14-1719 or	
		14-1789	Model T521W
	Cabinet	14-1720	Model T521F
	Knob	14-1307	Volume & Tuning
	Knob	46-1312	Clock-Alarm, Radio & Auto-Off
	Dial Scale	26-531	Radio
	Dial Pointer	59-304	
	Dial Crystal	192-184	Radio
	Dial Crystal	192-193	Clock

CHASSIS—BOTTOM VIEW



ZENITH MODEL T521F (Ch. 5T03)



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.5Ω	24Ω	37Ω	†1KΩ	†1KΩ	2.7Meg
V 2	12BA6	2.7Meg	0Ω	12Ω	24Ω	†1KΩ	†1KΩ	68Ω
V 3	12AT6	4.7Meg	0Ω	0Ω	12Ω	0Ω	547KΩ	†471KΩ
V 4	50C5	150Ω	470KΩ	37Ω	87Ω	470KΩ	†1KΩ	†272Ω
V 5	35W4	TP	NC	87Ω	117Ω	112Ω	112Ω	50KΩ

ALL MEASUREMENTS WITH CLOCK DISCONNECTED.
†MEASURED FROM PIN 7 OF V5.
TP-TIE POINT.
NC-NO CONNECTION.

IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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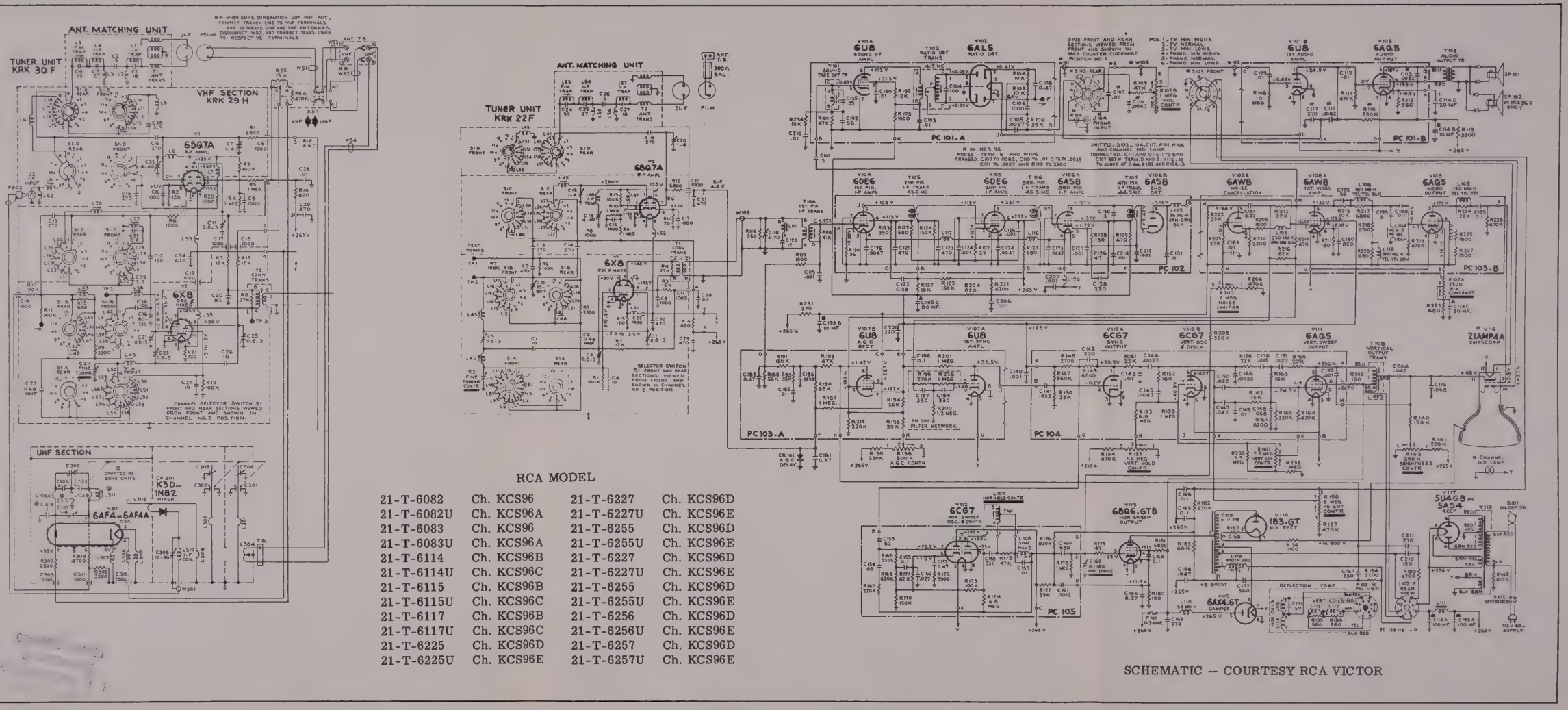


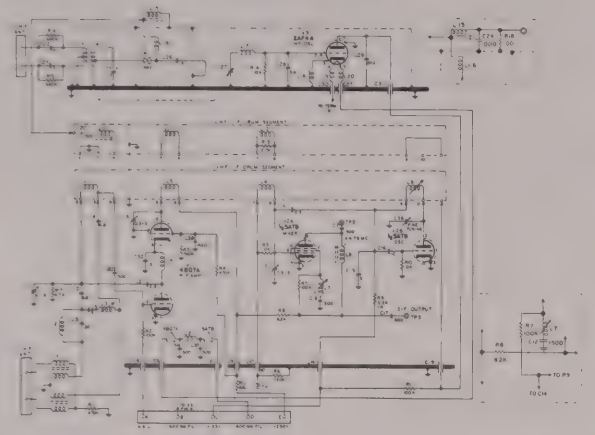
RCA MODEL

21-T-6082	Ch. KCS96	21-T-6227	Ch. KCS96D
21-T-6082U	Ch. KCS96A	21-T-6227U	Ch. KCS96E
21-T-6083	Ch. KCS96	21-T-6255	Ch. KCS96D
21-T-6083U	Ch. KCS96A	21-T-6255U	Ch. KCS96E
21-T-6114	Ch. KCS96B	21-T-6227	Ch. KCS96D
21-T-6114U	Ch. KCS96C	21-T-6227U	Ch. KCS96E
21-T-6115	Ch. KCS96B	21-T-6255	Ch. KCS96D
21-T-6115U	Ch. KCS96C	21-T-6255U	Ch. KCS96E
21-T-6117	Ch. KCS96B	21-T-6256	Ch. KCS96D
21-T-6117U	Ch. KCS96C	21-T-6256U	Ch. KCS96E
21-T-6225	Ch. KCS96D	21-T-6257	Ch. KCS96D
21-T-6225U	Ch. KCS96E	21-T-6257U	Ch. KCS96E

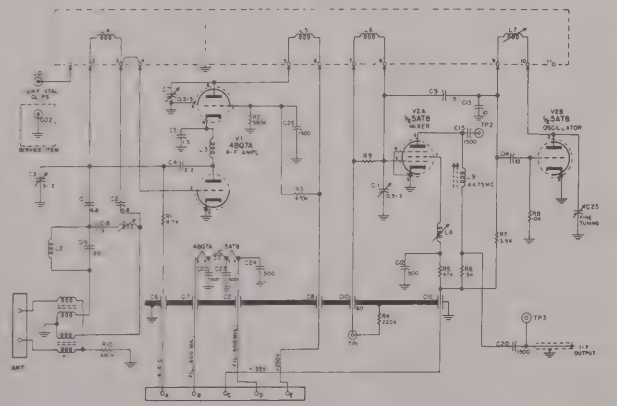
SCHEMATIC — COURTESY RCA VICTOR

SCHEMATIC — COURTESY CROSLEY DIV. AVCO MFG. CORP.

UHV - VHF TUNER
(Part No. 159698-1)



VHF TUNER
(Part No. 159725-1)



CROSLEY MODEL

J-21LPKBF	Ch. 476
J-21LPKBU	Ch. 477
J-21LPKMF	Ch. 476
J-21LPKMU	Ch. 477

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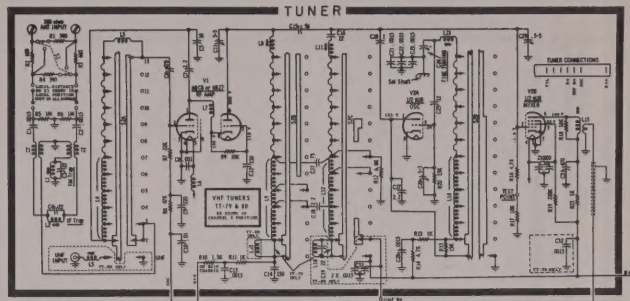
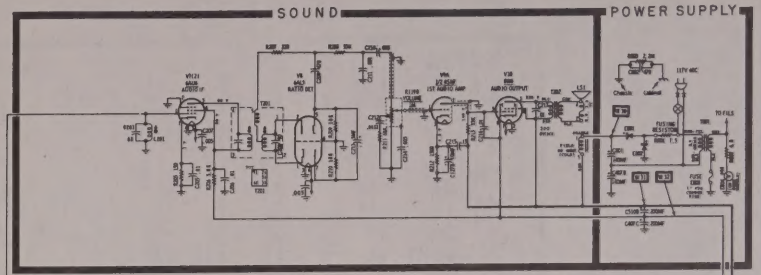
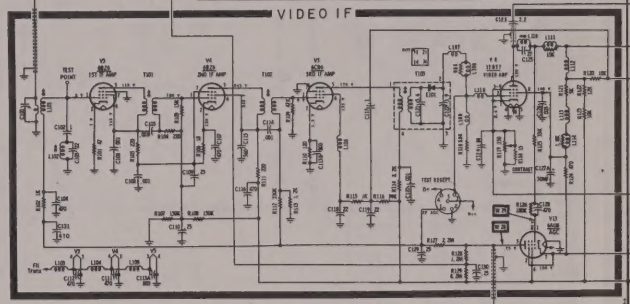
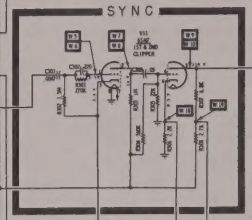
MOTOROLA MODEL

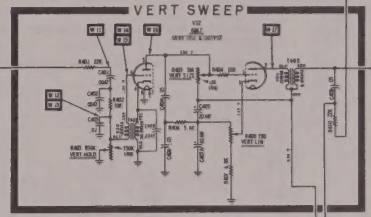
21T26B	Ch. TS-534
21T26BA	"
21T26BR	"
21T26BRA	"
21T26CH	"
21T26CHA	"
21T27B	"
21T27MA	"
21T27PK	"
21T28	"
21T28B	"
21K37B	"
21K37BA	"
21K37BR	"
21K37BRA	"
21K39	"
21K39B	"
21K40	"
21K40B	"
24K9	"
24K9B	"
24T3BR	"

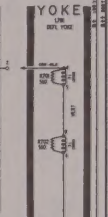


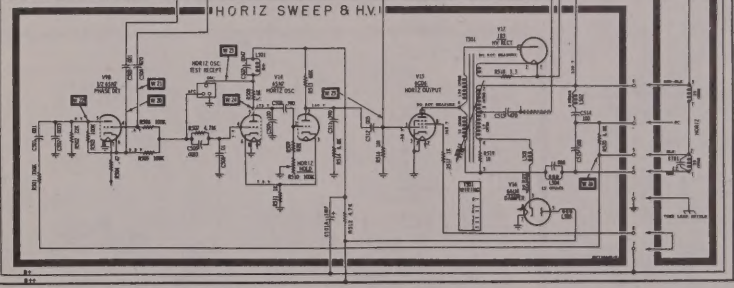


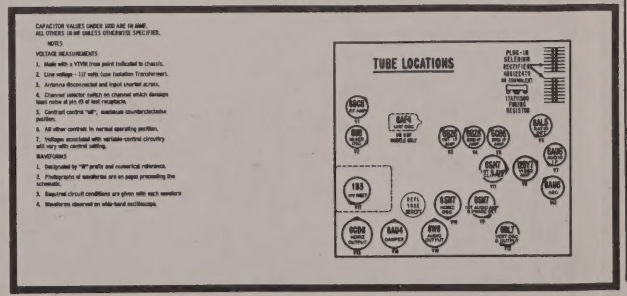












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DENVER, COLORADO

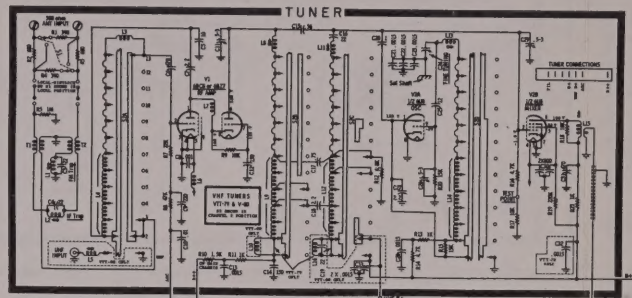
SCHEMATIC — COURTESY MOTOROLA INC.

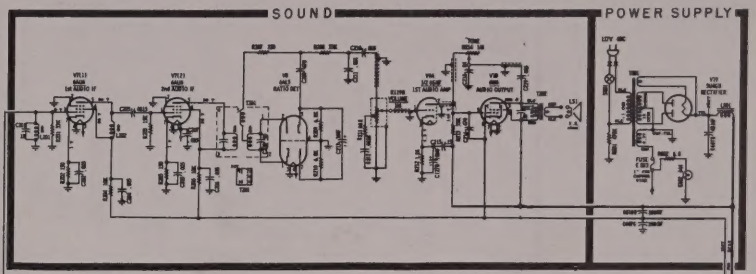
MOTOROLA

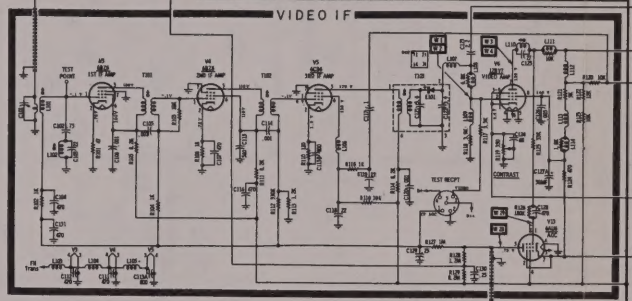
MOTOROLA MODEL

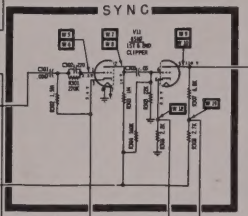
21C4	Ch. TS-533
21C4B	"
21K41	"
21K41B	"
21K42	"
21K42B	"
21K43	"
21K43B	"
21K44B	"
21K44W	"
21K45	"
24K10	"
24K10B	"
24K11	"
24K11B	"
24T4	"
24T4B	"

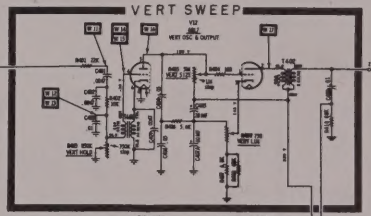
SCHEMATIC — COURTESY MOTOROLA INC.

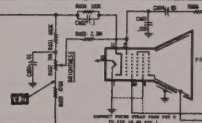


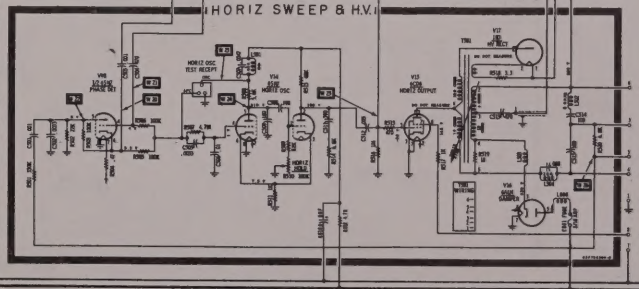


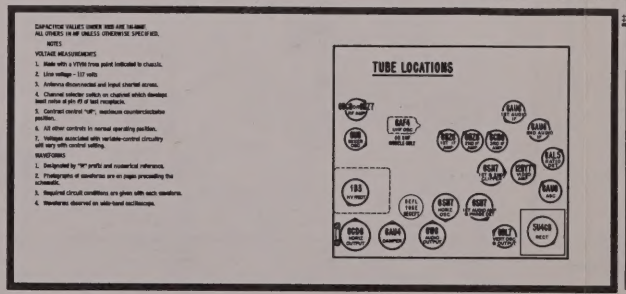












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